A STUDY ON SPEED AND ACCIDENT IN THE ROUTE OF DHAKA-MAWA-DHAKA EXPRESSWAY

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A thesis submitted to the Department of Civil Engineering in partial fulfillment for the degree of Bachelor of Science in Civil Engineering

Department of Civil Engineering

Sonargaon University

147/I, Green Road, Dhaka-1215, Bangladesh

Section: 17A

Fall-2022

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The thesis titled "A Study On Speed And Accident In The Route Of Dhaka-Mawa-Dhaka Expressway" submitted by Sanjoy Chandra Roy (BCE1901016113), Md. Shahriar Kabir (BCE1603009149), Chanchal Kumar Das (BCE1901016145), Md. Rakibul Islam Sarker (BCE1901016145) & Md. Jamal Uddin (CE2002020117) has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering on Date-of-Defense.

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DECLARATION

It is hereby declared that this thesis/project or any part of it has not been submitted elsewhere for the award of any degree or diploma.

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Dedicated

to

Our Parents

ACKNOWLEDGEMENTS

ABSTRACT

This study is aimed to investigate the causes of road accidents and know the speed at Dhaka to mawa expressway. Dhaka-Mawa Expressway, the country's first-ever international standard expressway. A new era of road connectivity has begun between the capital and south and southwestern parts of the country, reducing travel time by several hours. Investigation was based on field surveys and questionnaire surveys. Questionnaires were done on drivers and passenger. For this purpose 50 driver and 50 passenger were selected in each category. Investigation reveals that according to Drivers the causes of expressway road accident were over speed 50%, overtaking 22%, pedestrian 21% and Weather 7%, at the selected roads on Dhaka - Mawa Expressway. Passenger said that the causes of expressway road accident were over speed 40% overtaking 23%, pedestrian 27% and weather condition 10%, at the selected roads on Dhaka-Mawa Expressway. In this particular expressway gain in speed is a tendency of all the drivers. Most of the speed range found in this expressway for different types of vehicles such as Bus (50-90 km/hour), Truck (40-80 km/hour), private Car (95-120 km/hour) and Motorcycle (60-120 km/hour). We analyze vehicle data through driver, traffic police and speed meter apps of different vehicles. Field survey reveals that there are many urban areas and suburban areas including market besides the road as well as roadside activities. There was not enough foot over bridges in Dhaka Mawa expressway. Only one foot over bridge in Bejgao area.

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CHAPTER 1
INTRODUCTION

1.1 General

For a country like Bangladesh, infrastructure-megaprojects are crucial drivers for accelerating economic growth. For such a developing economy, megaprojects are necessary for increasing GDP growth rate. This growth rate in turn is important for capital accumulation and funding other megaprojects in future. Dhaka-Mawa-Bhanga Expressway, the country's first-ever international standard expressway. A new era of road connectivity has begun between the capital and south and southwestern parts of the country, reducing travel time by several hours. The high-speed superhighway will contribute to the national economy by boosting trade and commerce in the country as it will significantly improve the connectivity between Dhaka city, and the entire Khulna and Barishal divisions and parts of Dhaka division The Padma Bridge is estimated to increase the GDP of the country by more than one percent. It will benefit about three crore people across 21 south-western districts of Bangladesh. These districts will be connected with the growth centres through better connectivity. They can be used as economic corridors. The Padma Multipurpose Bridge provides four lanes for road traffic on top deck and in bottom deck a Broad-gauge Single Railway Track. After this, construction of a rail link between Dhaka and Jashore earned prime importance for connection of Dhaka with the South-west part of the country.

Fully operational Metro rail will be added to Dhaka's public transport later this year. This project will actively work on changing the transport system of Dhaka city. It will save transportation time and reduce traffic jams at the same time. Karnaphuli Tunnel Project has achieved a "breakthrough" The project in Chittagong is being constructed by China Communications Construction Company Limited (CCCC). The completion of the project will greatly improve the traffic conditions in Chittagong and promote economic development of Bangladesh. Over all we can say that, this type of projects will improve Bangladesh economic, socio economic condition and fate radically.

Dhaka-Mawa-Bhanga Expressway was opened for traffic on March 11, 2020. The people of 22 districts in the country's south and southwestern region, including Munshiganj, will directly be benefited from the modern expressway.

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1.2   Objectives

The specific objectives of this study are as follows:

- To know the speed range of different types of vehicles.
- To find out the speed variance among Morning and Evening for different type of vehicles.
- To identify the types of accident, time and location.
- To propose some suggestion to reduce road accident.

1.3   Organization of the Thesis

In addition to this introductory **Chapter one**, this thesis consists of five different chapters. **Chapter two** deals with the relevant literatures concerning theoretical background for the study which includes road speed limit, lighting condition weathers conditions, bus stopping, speed of vehicle's, pedestrian facilities, causes of road Accident in our society and types of accidents in that route. **Chapter three** covers the different methods of performing the study and adopted methods for the study. **Chapter four** presents the collected data and analysis of this data. **Chapter five** gives some recommendation to improve the existing situation.

CHAPTER 2
LITERATURE REVIEW

2.1   The term accident is used to mean an event that produce or has a potential to produce an injury. An accident which occurred or originated on a road open to public traffic resulting in either injury or loss of life or damage of property, in which at least on moving vehicle was involved. Some person thinks that accidents are unpredictable, random and therefore not preventable. Actually the events which produce damage to people, are non-random, have identified risk factors and involved interaction among people, vehicles, equipment's, physical and social environment. In this study the term "accident" is used to denote the events which produce damage to people and vehicle due to the movement of vehicles.

Everyone recognizes that, in today s world, transportation is a key element of the global economy. It has changed the face of employment, trade, family life and health care, bringing benefits that were unimaginable 100 years ago. However, the price we are paying in form of road crash mortality and morbidity for such benefits is too high. The shock and grief these events cause are all too well-known throughout the world. Their impact is particularly higher in poorer countries, where 90% of the road fatalities occur. The primary objective of any accident study is to provide free, safe, and quick traffic movements on the highway. The accident problem is of very complex nature as so many factors involved in its occurrence. During the literature review on previously performed studies in Bangladesh on related terms of accidents, it was revealed that several analyses was done for different corridor including Cinematic accident on Dhaka-Mawa national expressway for different research work. Several research reports have been studied and they have been summarized in these chapter. This chapter also contains brief discussion on several methods and guidelines of accident black spot in different country based on their standards.

2.2   Related Works in Foreign Countries

A expressway is a special road type, designed to handle the heaviest possible load of road traffic, usually between cities, and to allow driving at a consistently high speed. Highways are two-way roadways with two or more lanes in each direction, a dividing island (islet) between opposing streams and an auxiliary lane in one direction. The main feature of highways, apart from more than one lanes per direction, which distinguishes it from other

types of roads (national or provincial road), is the lack of traffic jams and traffic lights and the use of uneven intersections. Historically, Italy was the first country in the world to start constructing highways, i.e. expressways for passenger cars only. The Milan-Laggi motorway (connecting Milan with Varese) was conceived by Piero Puricelli, a civil engineer and businessman. It received the first permits to construct a public expressway in 1921 and completed its construction (one lane in one direction) between 1924 and 1926. By the end of the 1920s, more than 4,000 kilometers of multi-lane highways had been built (compared to 6,400) in 2012 throughout Italy, connecting Italian major cities and small rural towns. Traffic accidents per kilometre occur rarely on highways compared to other roadway types. The main question to be answered through the approach of the current research is how the speed limit set in each case may affect the accident rate value.

2.3   Related Works in Bangladesh

Many studies on accident were performed for different corridor in Bangladesh. But a comparative study on accident between more than single national highways are not too much available except the study of Elahi, (1986) on Dhaka-Mymensingh, Dhaka-Narayanganj and Dhaka-Chittagong national highway. This is probably due to limitation of summarized the accident data of same year interval for different highways. The literature review has revealed that the following studies were made on similar topic of accident and black spot study.

Elahi, S.M (1986) in his MSc Engg. thesis in BUET analyzed the accidents on three selected national highways namely, Dhaka-Mymensingh, Dhaka Narayanganj and Dhaka-Chittagong highways. This analysis was done to find accident trend and severity. Twenty prone locations are on these highways were identified on frequency of accident occurrence. Detail topographic survey was carried on these locations. The study revealed that among the geometric aspects in adequate shoulder and pavement width are important causes of accidents. Findings of his analysis were average annual increase rate of accident is 14% during period of 1979 to 1984. Day time accidents are much higher than night time. During day time 74% accidents were occurred. Low accident rate has been observed in dry season. Then these studies provide some remedial improvements for these prone locations for reducing their accident rate.

Sharrmeen, (1996), in her MSc Engineering thesis in BUET upon truck involvement in road accidents in Metropolitan Dhaka revealed that about 32% accidents are fatal, 58% injuries, 9% property damage truck involve accidents.

Accident occurred mostly in road link. Maximum of the accidents are rear end 29%, hit pedestrian 28% and head on 10%. A statistical quality control method employed to identified hazardous links. The vulnerable road users group IS pedestrian 25.5%, followed by baby taxi 15.5%, rickshaw 15.1%. She also revealed in her study that nearly 15.5% of truck drivers were biased by alcohol.

Hoque, (1991) conducted a comprehensive study on Dhaka-Aricha Highway. In total length 81.4 km, about 965 accidents out of these 419 fatal, 504 injuries, and 22 property damage only were recorded during the five year period 1985-1989. Data on accidents occurring on the highway and available to police during the aforesaid period were examined and characteristics of accidents were analyzed. The characteristics included relating to locations, road users' movements, vehicles and time of accident, accident rates, road site hazard and road casualties. Analysis reveals that each year there are at least 114 fatalities and 968 injuries, resulting in about 6 casualties per accident on this highway. Various low cost engineering treatments like shoulder improvements, delineation of guardrails, provision of overtaking lanes and improvements of deteriorating traffic lane and narrow bridge approaches were suggested by him.

Hasan, (2007) in his M. Engineering thesis in BUET analyzed on involvement of vehicle factors in road accidents at Jamuna Multipurpose Bridge corridor, revealed that about 16.6% accidents happened due to vehicle defeat and casualty of this factor is 31.9%. Common vehicular faults due to accidents are bursting which accounts 42.5% accident and 83.7% casualty of all vehicular defeat related accident which is followed by passenger fall down from roof top 7%, brake failure 5.7%, jam 2.6%, axle fallen 0.9% and defective light 0.1%. Questionnaire survey revealed that lack of vehicle fitness checking in field, poor vehicle maintenance practice, vehicle specification, overloading etc are identified as the major underlying causes of vehicular defeat related problem.

Islam, (2004) in his MSc. Engg. thesis in BUET made another comprehensive study in accident black spot on Jamuna Multipurpose Bridge. He used the methodology to find the locations and level of clustering and non-clustering of accident events by using accident spot map and pin diagram. For analysis, collision diagram was prepared showing all accidents events in detail. From his analysis it was shown that about 64% accident occurred during day light but about 36% accidents are in darkness. On the other analysis about 62% accidents occurred in fine weather condition, 18% in rainy period and 20% in foggy condition. Then an economic analysis of accident was done in this study. Limitation of this study is the detail analysis for causes of accidents with remedial improvements of were not precisely described.

Another study was conducted by Hoque, et aI., (2005), on Dhaka-Aricha Highway. This study provides details on the improvement measures undertaken in three black-spot areas. In this study an attempt has been made to evaluate the effectiveness of safety improvement measures. Their effectiveness was evaluated by applying the "before-after" and "control-site" methods. Findings from the analyses suggest that safety improvement measures were very effective in reducing the frequency as well as the severity of accidents. In economic terms, this study is also estimated benefits from accident savings far outweighed the investment costs of safety improvements. The limitation of this study is, accident analysis based on vehicle involved, severity index, period of action are not precisely described. In the selected black spot detail line diagram with location Figure is not discussed for safety improvements.

Rafuzzaman, M. (2003) in M. Engineering thesis in BUET also conducted another study on characteristics of accidents on selected arterials of metropolitan Dhaka in terms of collision type, severity, modes used by the victims, weather condition revealed that in six years (1996 to 200 I) 1847 no. of accidents occurred in his study five arterials in Metropolitan Dhaka city. The most pronominal collision types are hit pedestrian 39.2% and rear end accidents 32.54%. Involvements of motorized vehicles are 77.96% and non motorized vehicles are 22.04%. Severity levels are fatal 37.09%, grievous 40.06%, simple 10.18% and collision only 13.22%. Overall 71.36% accidents were occurred in link and 28.64% accidents at intersections. About 98.48% accidents were occurred in fair weather condition and 1.52% in rainy condition. He also reveals in his study about 59.61% accidents occurred in day time. Then provide some remedial measures for reduction of accidents.

CHAPTER 3

METHODOLOGY

3.1   Methodology outlines the techniques for the collection of data and the basic planning approach. First step is to identify the objectives and selection of the study area are adopted to play the role of sheet anchor of any study and so a clear idea and good graph of the related subject is very essential for the attainment of the project goals, this chapter focuses on each objective depend on how the corresponding theoretical background of the study with elaborate and in-depth discussion on the relevant definitions and procedures regarding the, speed study, accident study in that route.

3.2   **Data Collection Mechanism**

The process of survey and all information collected from different sources were as follows:

- Field visits were made to different locations of the roads from Dhaka to Mawa expressway. To collect preliminary and final data and information, questionnaires were formulated and interviews were taken randomly with different categories of people including passenger and bus drivers.

- In addition, data and information were collected from different sources. Related journals, newspapers, articles and research papers were analyzed for the study and study area map were collected. The flow chart of the process of study is given.
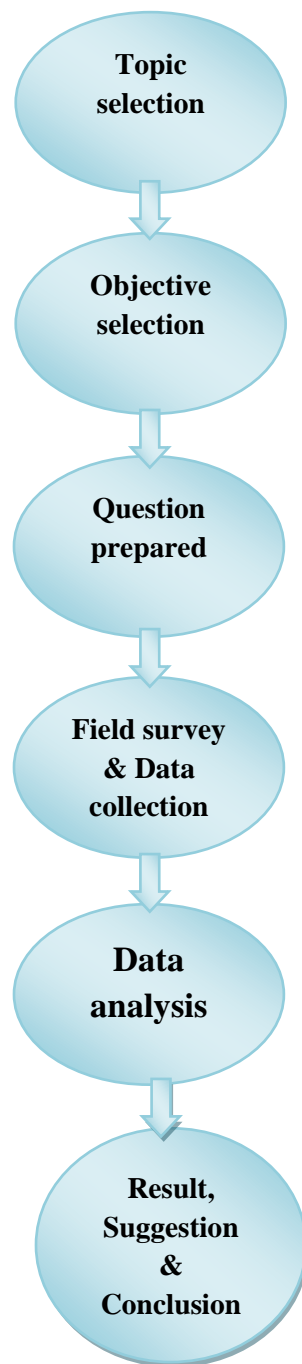
Figure: 3.1 Showing the methodology

3.3 Description of Study Area

Selection of the study area is very important for any kind of dissertation and research study. According to the title and objectives a part of the main arterial thoroughfare of Dhaka city was taken for study which extends from selected express on Dhaka-Mawa Expressway. The locations of study points were Postogola bridge, Hasanabad, Ikuria, keraniganj, Nimtola, Dogachi, Notunrasta, Abdullahpur, Shamashpur area to collect information questioner were developed for both drivers and passenger. The questioners were developed based on the factors like causes of road accident, who are the main responsible group for road accident, awareness among the people and their suggestions to reduce the percentages of road accident. In addition, different data and information were collected from different sources like Wikipedia, google scholar, Different research paper, newspaper, etc.

3.4 Field observation and Reconnaissance:

Reconnaissance was a process to observe the study area at a glance for preliminary data collection. Several on-spot visit and in formal data were collected for clear conceptualization and to develop a strategy to conduct the study.

3.5 Preparation of questionnaire

Based on the field observation and reconnaissance several draft questionnaires were prepared. These questionnaires were tested, verified and cross-checked for its efficiency, and final questionnaires were prepared after wards two types of questionnaires were prepared; for the driver, and passenger in study area.
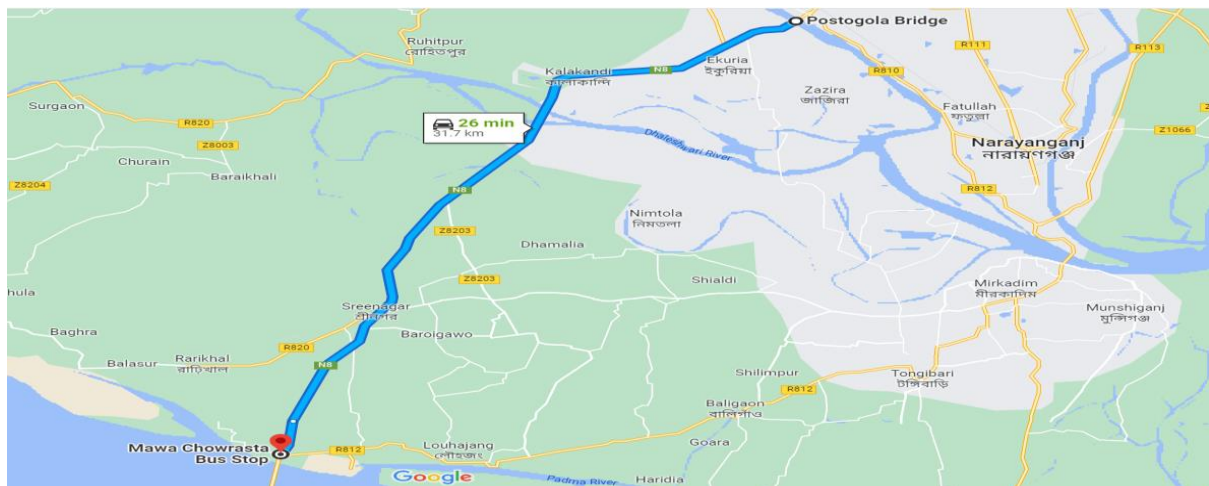
Dhaka Mawa Expressway

Figure 3-2: Location Map of Study area.

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3.6 Dhaka-Mawa Expressway

The Executive Committee of the National Economic Council (ECNEC) had approved the expressway project on May 3, 2016. RHD and Special Work Organization of Bangladesh Army, under the supervision of the Road Transport and Highways Division, are implementing the project at a cost of Tk11,003.90 crore. The Bangladesh Army's 24 Engineering Construction Brigade has been implementing both the main and supporting projects. The expressway was opened for traffic on March 11, 2020.This six-lane expressway has two service lanes, five flyovers, 19 underpasses, two interchanges, four railway over-bridges, four large bridges, 25 small bridges and 54 culverts. After finishing construction of Padma Bridge, the two side of expressway will be connected through it. The expressway starts from the Dholaipar intersection, where an artery of the Mayor Mohammad Hanif Flyover (Gulistan-Jatrabari) descends, and goes towards Mawa through the Bangladesh-China Friendship Bridge (locally known as Postogola Bridge) over Buriganga river.The length of the highway is 31.7 km from Jatrabari to Mawa

Figure 3.3 Expressway of Dhaka-Mawa

3.7   Definition of the Related Terms

Before going into the detail of this study, it is important to get familiarized with the terms related to Accident, black spot, Traffic flow characteristics and speed of vehicle study. Therefore, in this section, the important parameters of accident analysis, black spot analysis,

traffic flow analysis and vehicle speed analysis, which are frequently used in this study, are described in brief.

Expressway

An expressway is a wide road that is specially designed so that a lot of traffic can move along it very quickly. It is usually divided, so that traffic travelling in one direction is separated from the traffic travelling in the opposite direction.

Casualty

Any person killed or injured as a result of an accident is known as casualty.

Cinematic accident on Dhaka-Mawa expressway, 7 cars damaged

The intensity of winter has increased in the country along with dense fog. Due to dense fog, seven vehicles were crashed at Sirajdikhan of Munshiganj on the Dhaka-Mawa Expressway. A car pushed another from behind thus 7 cars damaged, this is like a cinematic accident.

Figure 3.4 : Cinematic accident on Dhaka-Mawa expressway, 7 cars damaged

Seriously/Grievous Accident

A person who is injured and admitted to hospital as result of an accident and who does not die as a result of those injuries within 30 days of the accident.

Non-collision type accident

Accident of motor vehicles which occurs without hitting other vehicles and or any objects is called non-collision type accident.

Collision type accident

When motor vehicle hits pedestrian, another vehicle in traffic, animal, fixed objects etc in an accident.

Passenger

Any people other than the controllers, who are on boarding, entering, alighting or failing from a road vehicle at the time of accident, provide a portion of the person is in on the road vehicle.

Pedestrian

Any person who is not on boarding, entering, failing from a road vehicle at the time of accidents is called pedestrian.

Traffic Volume

Traffic volume is defined as the number of vehicles that pass a particular point along a road way or traffic lane per unit of time. Volume is a measure to quantify the traffic flow and is commonly measured in units of vehicles per hour, vehicles per day.

Average Daily Traffic (ADT)

It is defined by the average number of vehicles that pass a particular point during a period greater than one day and less than one year. It is determined by dividing the total number of vehicles within a period of days. The ADT is readily obtainable where continuous counts of traffic are available. ADT volumes are useful in economic study of highway and also in the design of the structural elements of the road.

Spot Speed

It is the instantaneous speed of the vehicle as it passes a specified point on the highway.

Average Speed

It is the average of spot speeds of all the vehicles passing a specified point on the highway.

Running Speed

This is obtained by dividing the distance covered by the time during which the vehicle is actually in motion.

3.8   Overview of Express Lane

The high-speed super highway is contributing to the national economy by boosting trade and commerce in the country as it will significantly improve the connectivity between Dhaka city, and the entire Khulna and Barishal divisions and parts of Dhaka division.

Figure 3.5: Expressway lane

The people of 22 district in the country's south and southwestern region, including Munshiganj, will directly be benefited from the modern expressway. Commuters are getting the full advantage of the expressway as the 6.15-km Padma Bridge is completed and it connects the two parts 35-km Jatrabari intersection to Mawa and 20-km Panchar to Bhanga of the expressway. The government has opened the country's longest bridge for traffic by 25 June 2022. It now takes 3-3.5 hours to reach Faridpur from Dhaka using the two-lane road. The journey is takes shorter time as there is no traffic gridlock and slow-moving vehicles as the expressway was constructed with controlled access. Two service lanes are kept on both sides of the expressway for slow-moving vehicles so that speedy vehicles can move uninterruptedly.

3.9 Accident Study

Accidents may occur due to mistake carelessness and deliberate action of road users. It also occurs due to vehicle failure and also due to road surface characteristics. Generally the accident study is carried out for the following purposes

- To evaluate the existing facilities and to give support to the proposed design.
- To know the basic causes of accidents and suggest remedial measures at potential points.
- To justify economically, the proposed improvements.
- To compute financial loss due to accidents.

Typical modes of vehicular accidents are summarized as

- A moving vehicle collides with parked vehicle.
- Two vehicles approaching from different directions collide at an intersection.
- Head-on collision of two vehicles approaching from opposite directions.
- A moving vehicle collides with a stationary object.

3.10 Accident Involving Factors

Four basic components involving of the road transport system are following

The road users responsible for the accidents may be driver of one or more vehicles in involved the pedestrian and or the passengers.

Figure 3.6 Human Factor of Road Accident

Drivers

Driver is one of the vital road user elements to cause an accident. So the driver's fitness is a more factor for safe driving. Excessive speed and rush driving, carelessness, violations of rules and regulations, failure to see and understand the traffic situation and road sign and signal, temporary effect due to fatigue, sleep or alcohol and physical and mental conditions are responsible for creating road accident.

Figure 3.7: Accident on Dhaka-Mawa expressway

Pedestrians

Lack of knowledge regarding road users' traffic rules and regulations, violations of regulations and carelessness in using the road way are the main reasons for road accidents. In adequate pedestrian facilities also lead to accidents. Pedestrian facilities such as sidewalks, cross walks, special pedestrian barriers, pedestrian refuge islands, pedestrian tunnels and over pass should be design properly to reduce accidents.

Figure 3.8 Pedestrians crossing this expressway

Vehicular Factors

The following vehicular factors are mainly responsible for accident

- Failures of brakes, defeats in steering system and signalizing devices, tire bursts, deviation from specification such as overhanging length, width causes accidents.
- Presence of vehicles of varying speed operational characteristics in the same traffic creates hazards and conflicts and thereby may produce accident.
- Overloading of goods and passengers is another vehicular factors which causes road accidents.
- In Bangladesh the motorized vehicles play major role in transport. The vehicle such as rickshaw, van, push car has no light during night which causes also accident.

Figure 3.9 Vehicular factors of road accident at Dhaka-Mawa expressway

Environmental Factors

Environmental conditions are mainly sun-light, rain, dry, wet and weather conditions such as mist, fog, snow, dust, smoke or heavy rainfalls restricts normal visibility and make driving unsafe. Moreover, road surface become slippery and causes skidding of vehicles which can contribute a large amount of accident.

Figure 3.10: Environmental Factors of road accident at Dhaka-Mawa expressway

Road Condition

Road surface may be in damage condition, may be having pot holes, ruts etc. are the common vehicle failures.

Figure 3.11: Road condition factors of road accident at Dhaka-Mawa expressway
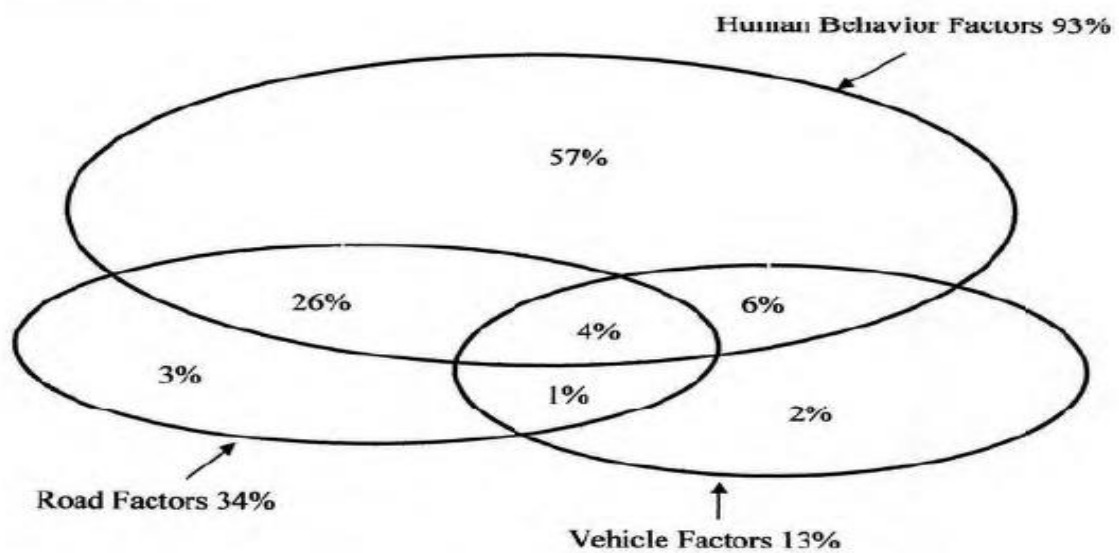
Figure 3.12: Accident Contributing Factors

Road Geometries

Road may be having improper sight distance, inadequate width of the shoulders, in proper curve design etc are also causes of accident.

Animal

Stray animals on the road make disturb to the driver and sometimes causes accident.

Figure 3.13: Animal factor at Dhaka-Mawa expressway

Mixed Traffic

A traffic stream having vehicles of varying range of speeds and characteristics creates traffic hazard and may causes accidents. The slow moving vehicles often block the way offset moving vehicles and causes road accident. Lateral moving tendency of mixed traffic stream is also vital cause of road accidents.

Speed breaker in the road

Some speed breakers are so badly made that the chassis of a private car gets dented when the car crosses over them.

Types of Vehicles

Figure 3.14: Types of vehicles at Dhaka mawa expressway

Lighting Condition

Figure 3.15: Lighting Condition

Other Factors

Incorrect signs or signals, gate of level crossing not closed when required, ribbon development, badly located advertisement boards or service station etc sometimes causes serious accident.

3.10 Methods of Accident Analysis

Traffic accident research methods can be broadly categorized under three major headings such as;
a) Theoretical

b) Empirical and

c) Simulative.

Maximum amount of accident research has been attributed to the empirical analysis of accidents. Accident analysis is also conducted both at micro and macro level. Macro scale considers accidents occur in a town, country, region, state or worldwide. On the other hand micro scale considers accidents occurring on a specific network, facility, location such as curve or intersection, airport, train station, highway exit, interchange etc.

Moreover most accident research has been conducted on the basis of empirical method which involves the use of sets of data obtained information of observations of counts.

These data are analyzed under two categories such as

a) Detail technical investigation of accident events and

b) General surveys of system wise accident patterns.

The general category of accident study is mainly oriented towards providing information of accident data in a more or less non-technical form. It is associated with describing rate i.e. accident numbers or fatality number in term per unit population, registered vehicle etc. and identified hazardous road locations. The technical category of accident study is based on specification collision diagram to determine the pattern of accident types, the reason of accidents and thus give direction toward appropriate remedial measures.

Macro Scale Analysis

The macro scale analysis accidents are summarized in a table, providing a record of performance of a region or a country in terms of one or more transport mode. Accidents occurrence severity (fatality, injuries, property damage) ant rates provide a statistical illustrative of safety performance. In this study, this method is adopted in order to understand trend in accident occurrence.

Micro Scale Analysis

Micro scale accident analysis can be subdivided into the study of individual accident, known as accident reconstruction and study of high accident locations. Location analysis in conducted at high accident frequency locations. The studies are based up on the individual

accident reports as a basis document. In our study this method is also adopted is accident black spot identification.

Statistical Analysis of Accident

The statistical analysis of road accidents helps to assess the effectiveness of various measures to decrease the accident rate. Thus the analysis estimates the relative safety of road stretches. As the mobility increases the probability of accident also increases. The number of accident found to increase with the number of road users or the number of vehicles and pedestrians on the roads. As the vehicle movements and the population are on the increase, the total numbers of accidents in the study area are likely to increase year after year. The reliability of the statistical analysis of accidents depends mainly on the reliability of the accident data; obtain from accident records.

Analysis of Individual Traffic Accidents

Each of the road accidents is analyzed by the traffic engineer to draw sound conclusion. In this study it is necessary to compute the original speeds of the vehicles involved in various types of accidents.

Accident Data Records

The various steps involved in traffic accident studies are collection of accident data preparation of accident report, location file and diagram, and application of the above records for suggesting preventive measures. Flowing steps are done before accident analysis:

Collection of Accident Data

The collection of accident data is the first step for in the accident study. Standard form for collecting the accident data is prepared first aspects for data collection. The details to be collected are mentioned bellow here.

General

The accident report form contains date, time, persons involved in the accident and their particulars, classification of accident like fatal, grievous, simple and collision type of accident.

Location

Description and details of the location of accident are reported in the form.

Details of Vehicle Involved

In this item registration number make and description of the vehicles, loading condition and vehicular defeats are summarized.

Nature of Accident

In this item condition of the vehicles involved, details of collision, pedestrian and objects involved, damages, injuries and casualty etc are described.

Roads and Traffic Condition

Details of road geometrics, whether the road is straight or curved, surface characteristics such as dry, wet or slippery etc are mentioned. Traffic condition - type of traffic, traffic density are precisely reported in the report form.

Primary Causes of Accident

In record form, various possible causes of accident are included for primary idea.

Accident Cost

In this item, property damage, personal injury and casualties are reported.

Accident Reports

The police should be reported to the police authorities who would take legal actions especially in more serious accidents involving injuries, casualties or sever damage to property. Accident report of the individuals involved may be separately taken. The accident data should be collected as given above the accident report is prepared with all the facts which might be useful in subsequent analysis, claims for compensation, etc.

Accident Records

The accident records are maintained giving all particulars of accidents, location other details. The record may be maintained by means of location files, spot maps, collision diagrams and conditions diagrams.

3.11   Accident Investigation

The scientific approaches for accident investigations suggested are summarized below.
• It is suggested that a mobile laboratory may be kept ready in every city.

• A bus equipped with essential instruments to measure the alcohol content in the breath, reaction time and other driver characteristics, skid resistance of pavement surface etc. and

• A traffic engineer and his assistant may form a proposed mobile laboratory which should reach the accident spot as soon as possible after an accident.

3.11.1 Accident Rate Reduction Measures:

The various measures to decrease the accident rates may be divided into three groups.

(i) Engineering
(ii) Enforcement and
(iii) Education
These three measures are generally termed "3 - Es" (Khanna et aI., 200 I).

Engineering Measures:

Engineering measures are described in terms of Road Design, Preventive Maintenance of Vehicle, Before and After Studies, Road Lighting etc.

Road Design

The geometric design features of road such as sight distance, width of pavement, horizontal and vertical alignment design details and intersection design elements are cheeked and corrected if necessary.

Preventive Maintenance of Vehicle

The breaking system, steering and lighting arrangements of vehicle plying on roads maybe checked at suitable intervals and heavy penalties levied on defective vehicle

Before and After Studies

After making the necessary improvements in design and enforcing regulation, it is again necessary to collect and maintain the record of accidents "before and after" the introduction of preventive measures to study their efficiency.

Road Lighting

Proper road lighting can decrease the rate of accident during night. Lighting is particularly desirable at intersections, bridge site and at places where there are restrictions to traffic movement.

Enforcement Measures:

The various measures of enforcement that may be useful to prevent accident at black spotsare described bellow.

Speed Control

To enable drivers of buses to develop correct speed habits tachometers may be fitted so asto give the record of speeds. Also a surprise check on spot speed of all fast moving vehicles should be done at selected locations and timings and legal action on those who violate the speed limit.

Traffic Control Device

Proper traffic control device like signs, marking or channelizing islands may be installed wherever found necessary.

Training and Supervision

The transport authorities should be strict in testing and issuing license to drivers of public service vehicles and taxis.

Medical Check

The drivers should be tested for vision and reaction time at prescribed intervals.

Educational Measures

Educational measures are included Education of Road User, Safety Device which are described below:

Education of Road Users

The passengers and pedestrians should be taught the rules of road, correct manners of crossing etc. This may be possible by introducing necessary instruction in school for the children.

Safety Device

Imposing traffic safety week when the road users are properly directed by the help of traffic police and transport staff is a common means of training the public these days.

CHAPTER 4
RESULTS AND DISCUSSION

4.1 Data analysis is performed in three sections individually- questioner survey with drivers, Questioner survey with passenger survey. For this questioner survey 50 drivers were selected. Among them buses drivers, trucks drivers, motorcycles drivers and private cars drivers. And we questioner 50 bus passenger. Field visits were made in different section of Dhaka-Mawa Expressway to collect different kind of data for investigation. The locations of study points were Postogola bridge, Hasnabad, keraniganj, Ikuria, keraniganj, Nimtola area, Dogachi area, Notunrasta area, Abdullahpur area, Somashpur area To collect information questioner were developed for both drivers and passenger. The questioners were developed based on the factors like causes of road accident, who are the main responsible group for road accident, awareness among the people and their suggestions to reduce the percentages of road accident. In addition, different data and information were collected from different sources like Wikipedia, google scholar, Different recharge paper, newspaper, etc.

Figure 4.1: Traveling in Bus from Mawa to Dhaka

Figure 4.2: Traveling in CNG from Dhaka to Mawa

Figure 4.3: Spot speed data collection location (Notunrasta) on Dhaka-Mawa Expressway

4.2 Survey Locations and Schedule:

S. N	Date	Time	Location of Survey Field
01.	02/10/2022 2	10:00 am - 11:00 pm	Postogola bridge
02.	03/10/2022	02:00 pm - 06:00 pm	Hasnabad, Ikuria
03.	16/10/2022	09:00 am - 04:00 pm	Keraniganj
04.	07/11/2022	09:00 am - 05:00 pm	Abdullapur
05.	12/11/2022	09:00 am - 03:00 pm	Nimtala
06.	19/11/2022	11:00 am - 05:00 pm	Sreenagar
07.	26/11/2022	11:00 am - 06:00 pm	Shamashpur, Dogachi
08.	10/12/2022	10:00 am - 06:00 pm	Mawa Traffic Area

Table 4.1: Survey Locations and Schedule

4.3 Data Analysis

4.3.1 Asking Question to Driver

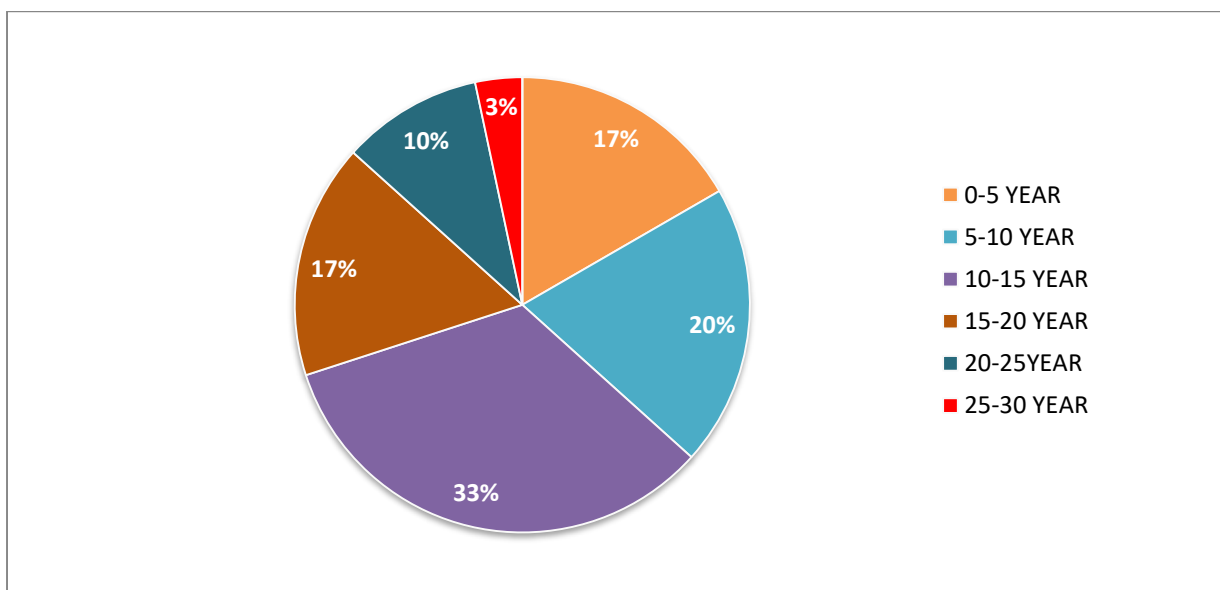1. **How many years of your experience as a driver?**

Figure 4.3.1: Driver experience chart on Dhaka – Mawa expressway

Comment: In our survey we finding many years of experience as a driver on Dhaka - Mawa expressway. Maximum driver has more than 10 years of experience.
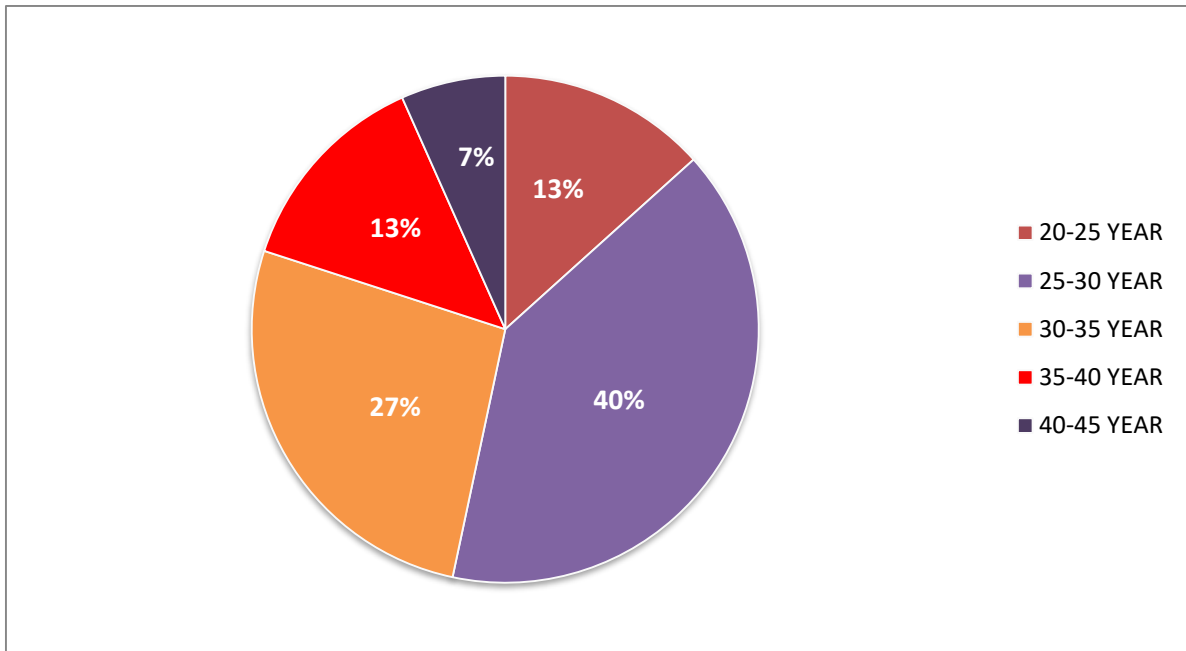
2. **How old are you?**

Figure 4.3.2: Driver Age chart on Dhaka – Mawa expressway

Comment: In our survey we finding different age's driver on Dhaka-mawa expressway. Maximum drivers are mid ages. Most of them are between the ages of 25 &30.
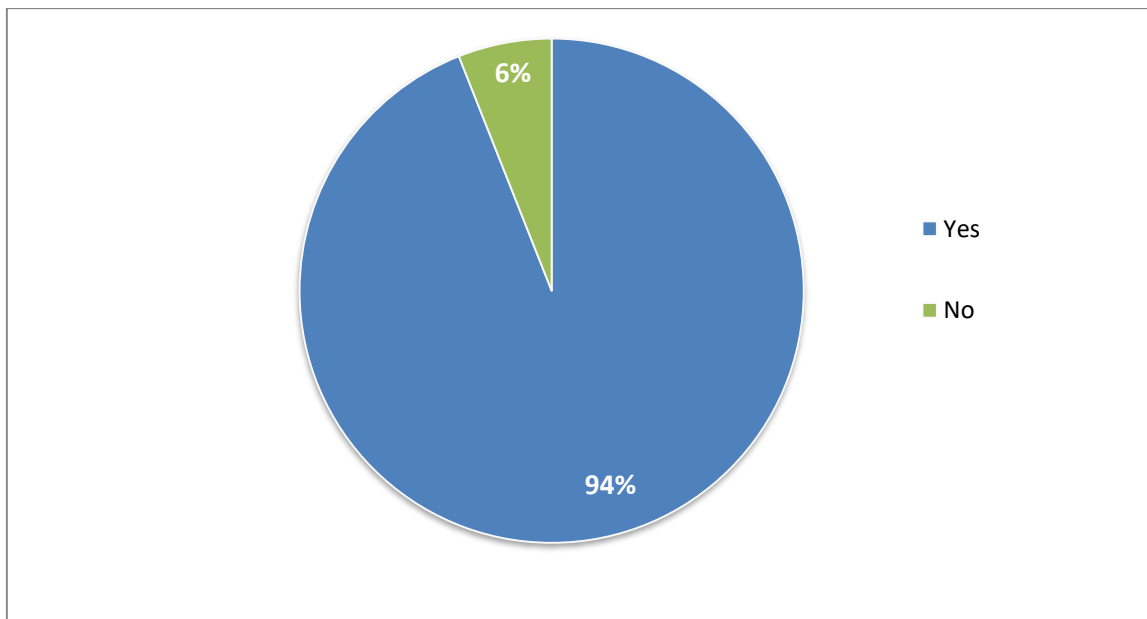
3.**Do you have your license?**

Figure 4.3.3: Driver license chart on Dhaka – Mawa expressway

Comment: From the result of survey, we found that the, Yes 94% and No 6% (only bike driver) on the expressway.

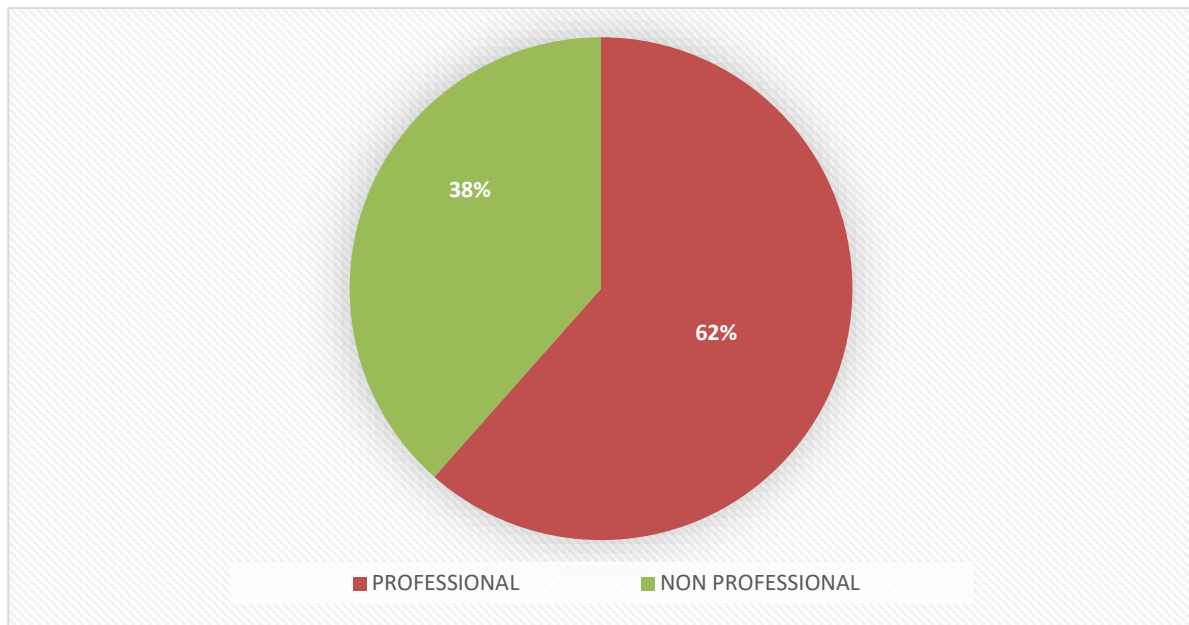4. **Your driving license is for which vehicles?**

Figure 4.3.4: Driver license chart on Dhaka – Mawa-expressway

Comment: From the result of survey, we found on Dhaka to Mawa expressway about the license. There are professional 53%, nonprofessional 33%,

5. According to you what are the differences between Highway & Expressway?

Highway	Expressway
A highway is a generic term given to roadways that are used to connect important cities, and usually have 4 lanes to provide for high speed traffic.	An expressway is a highway with partial access and extra facilities like access ramps and lane dividers.

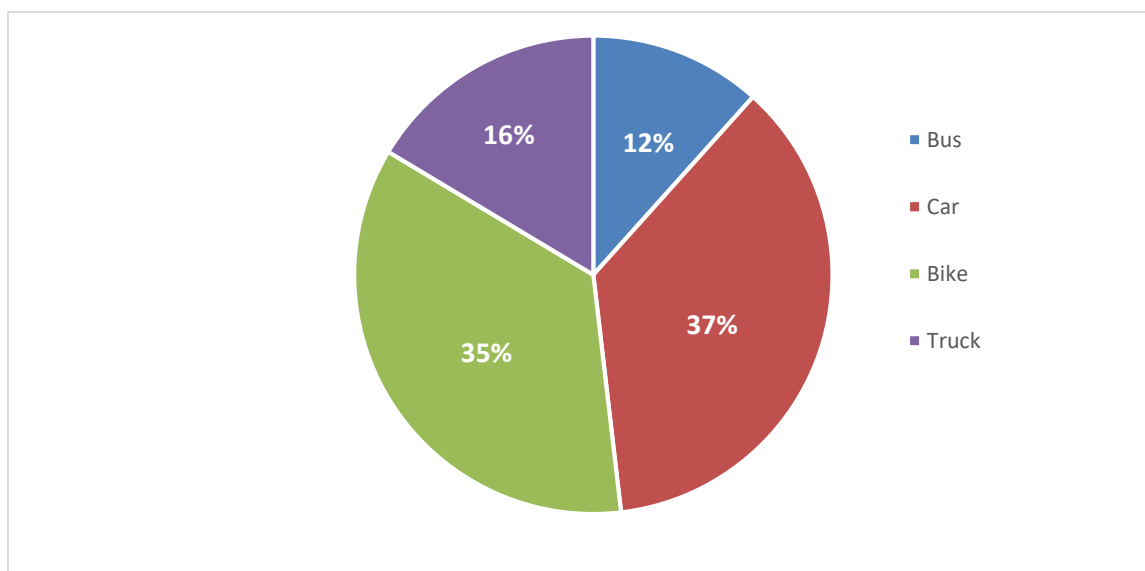**6. How many types of vehicles travel in this expressway?**

Figure 4.3.5: Different types of vehicles travel in Dhaka – Mawa expressway

Comment: From the result of survey we found, Dhaka to Mawa expressway different types in vehicles travel. Like as bus 12%, car 37%, bike 35%, truck 16%.

7. The Public Transport (Bus) when it starts journey at morning and when it last journey at night in Dhaka to Mawa?

Name of Vehicles	Starting time (Dhaka – Mawa) / (Mawa – Dhaka)	Last time (Dhaka – Mawa) / (Mawa – Dhaka)
Elsh paribahan	6:00 Am / 9:00 Am	8:00 Pm / 8:00 Pm
Bosumoti	7:00 Am / 9:00 Am	8:00 Pm / 8:00 Pm
Prochesta	6:30 Am / 9:00 Am	8:00 Pm / 8:00 Pm
Godhuli paribahan	6:00 Am / 9:00 Am	8:00 Pm / 8:00 Pm
Great bikrompur	7:00 Am / 9:00 Am	8:00 Pm / 8:00 Pm
Himaloy paribahan	8:00 Am / 9:00 Am	8:00 Pm / 8:00 Pm
Seba paribahan	6:00 Am / 9:00 Am	8:00 Pm / 8:00 Pm
Emad paribahan	6:00 Am / 9:00 Am	8:00 Pm / 8:00 Pm
BRTC paribahan	8:00 Am / 9:00 Am	8:00 Pm / 8:00 Pm

Table 4.3.1: The Public Transport (Bus) when it starts journey at morning and when it last journey at night in Dhaka to Mawa

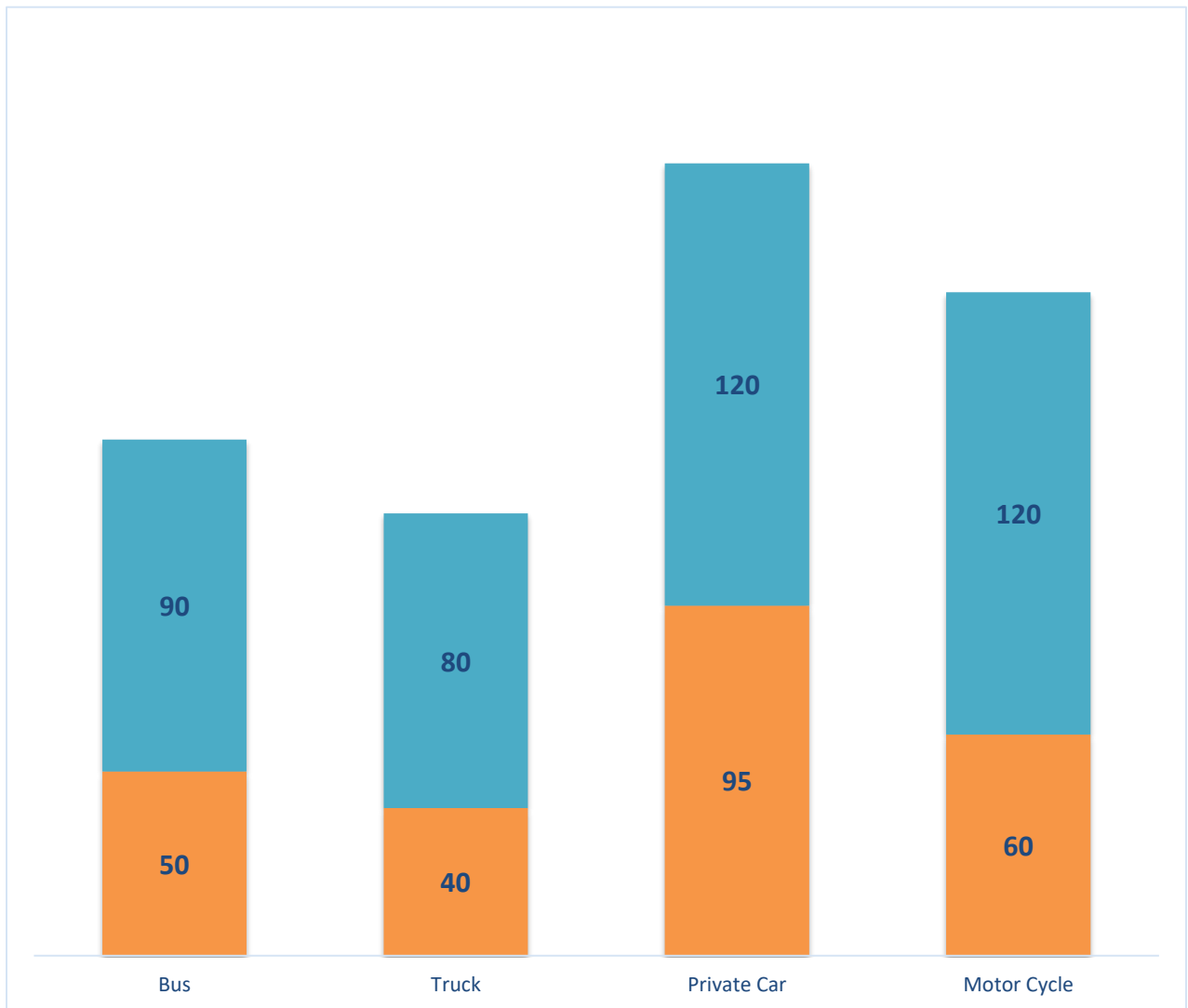**8. Speed range for different types of vehicles.**

Figure 4.3.6.: speed range for different types of vehicles chart on Dhaka – Mawa expressway

Comment: From the result of survey, we found on Dhaka- Mawa expressway, speed range for different types of vehicles, Bus (50-90 km/hour), Truck (40-80 km/hour), private Car (95-120 km/hour) and Motorcycle (60-120 km/hour).

9. Vehicles pressure in Dhaka-Mawa expressway at Morning.

Figure 4.3.7: Vehicles pressure in Dhaka mawa expressway at Morning.

Comment: From the result of survey, we found that the vehicles pressure in Dhaka to mawa expressway at Morning, bus 15%, car 34%, bike 38%, and truck 13%.

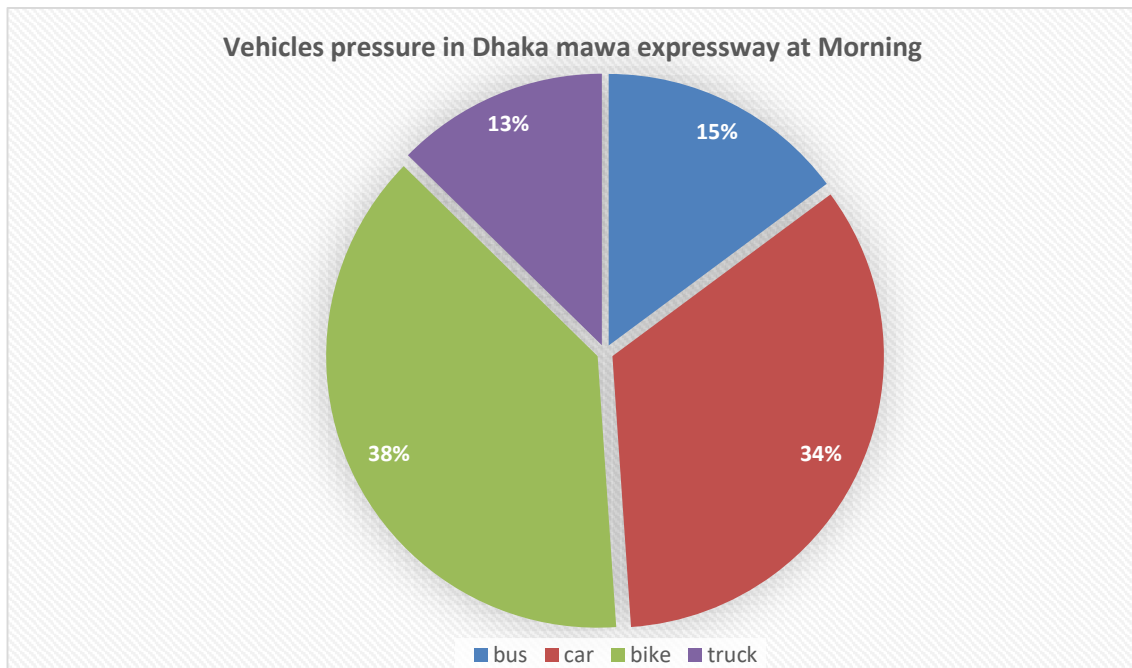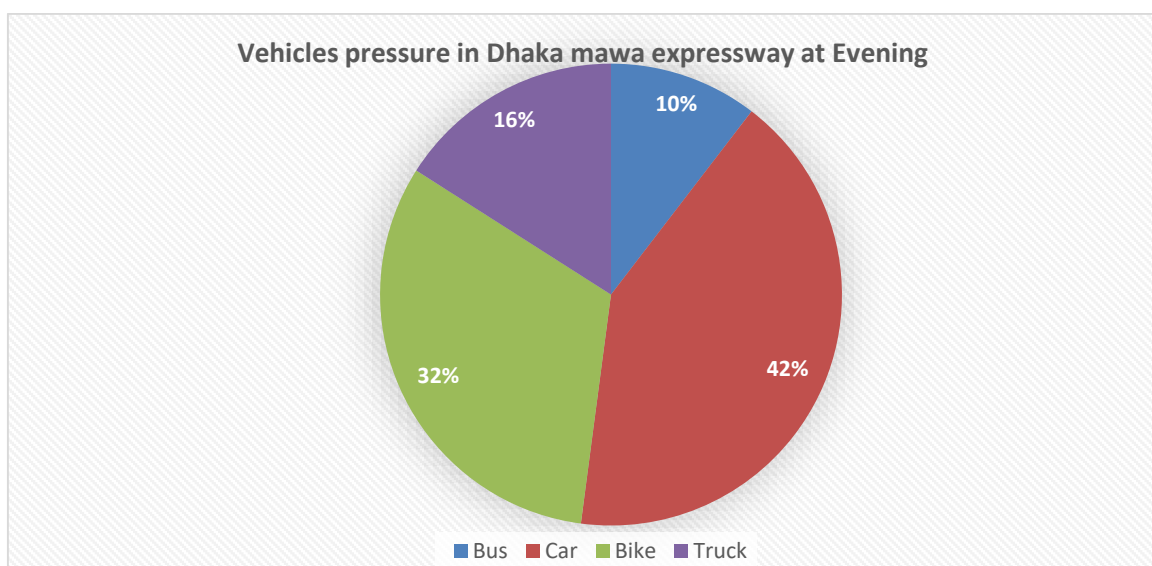**10. Vehicles pressure in Dhaka-Mawa expressway at Evening.**

Figure: 4.3.8: Vehicles pressure in Dhaka mawa expressway at Evening.

Comment: From the result of survey, we found that the vehicles pressure in Dhaka to mawa expressway at Evening, bus 10%, car 42%, bike 32%, and truck 16%.

11. What is your opinion about the lighting condition of expressway?

Figure: 4.3.9: lighting condition on Dhaka – Mawa expressway

Comment: From the result of survey, it's found that the Dhaka to Mawa Expressway about the lighting condition 100% good, drivers said that.

12. What kind of accident generally takes place in this route?
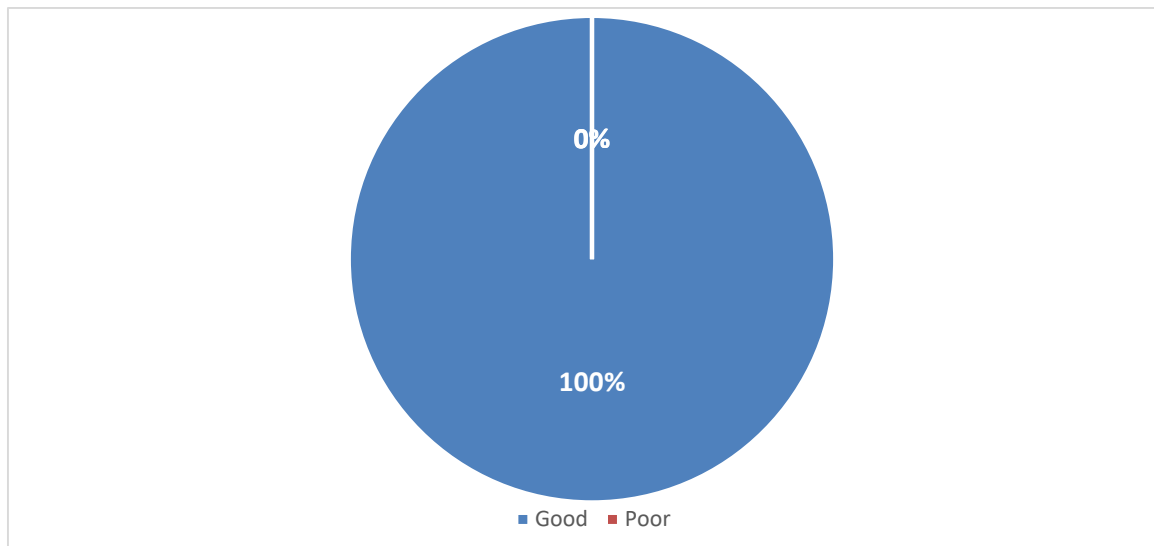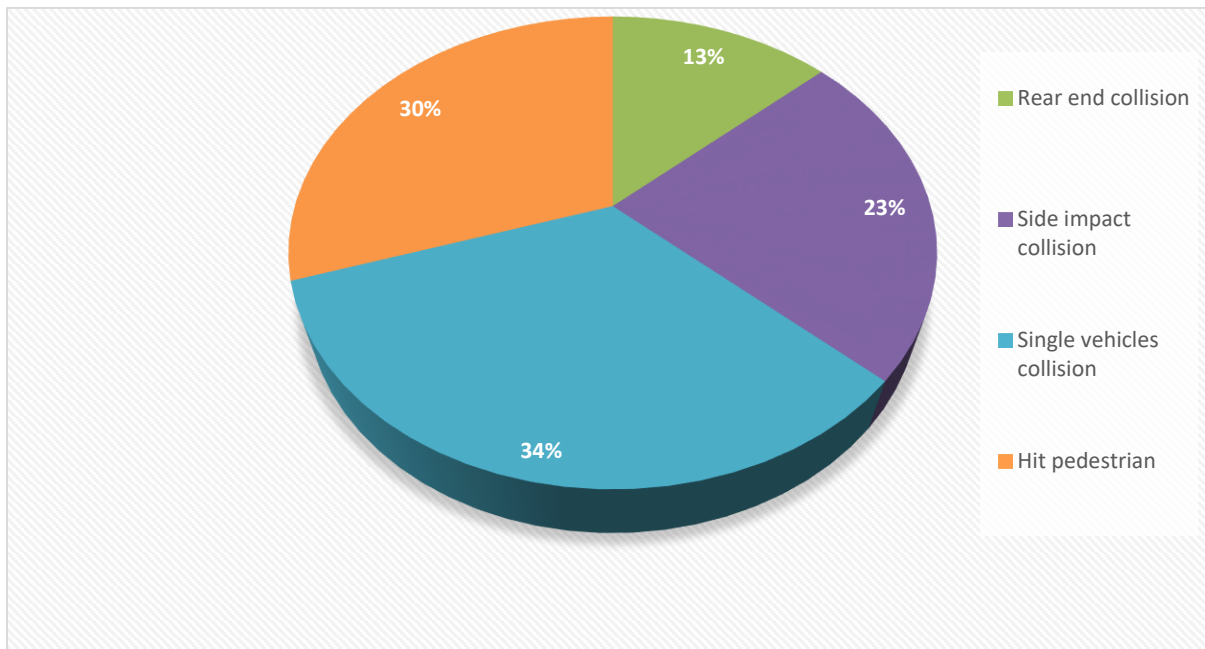

Figure: 4.3.10: Type of accident on Dhaka – Mawa expressway

Comment: From the result of survey, it's found that the Dhaka to Mawa Expressway accident generally takes place, Rear end collision 13%, Side impact collision 23%, Single car accident 34%, Hit pedestrian 30%.

13. **In which time to the accidents generally take place?**
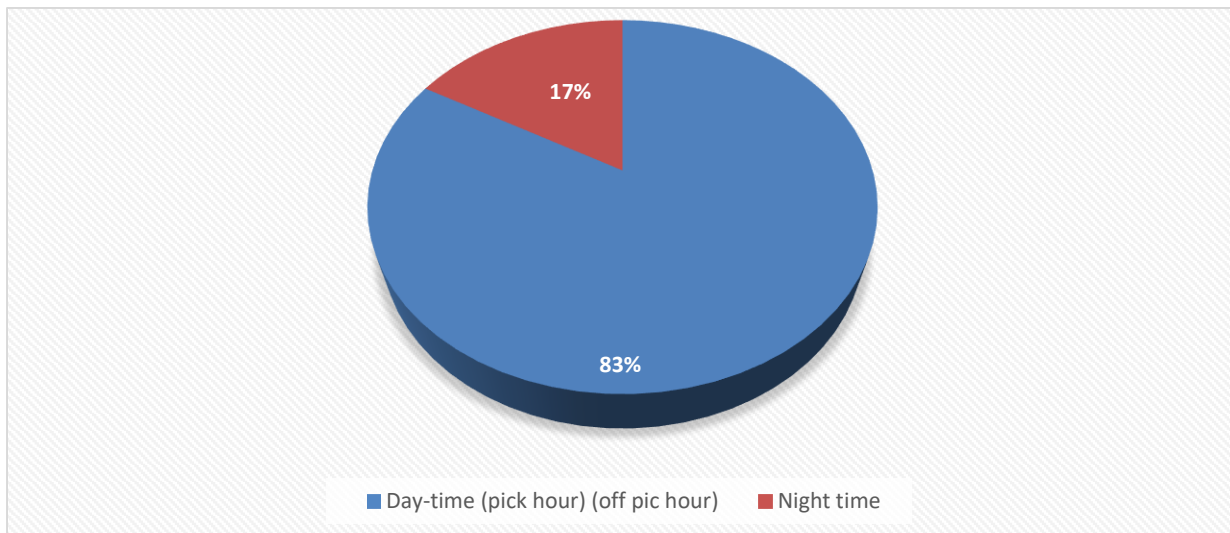
Figure: 4.3.11: In which time to the accidents generally take place

Comment: From the result of survey, we found that the Dhaka to Mawa expressway accidents occurred, day-time (pick hour) (off pick hour) 83%, and Night time 17%.

14. According to you which vehicle is mainly responsible for an accident?
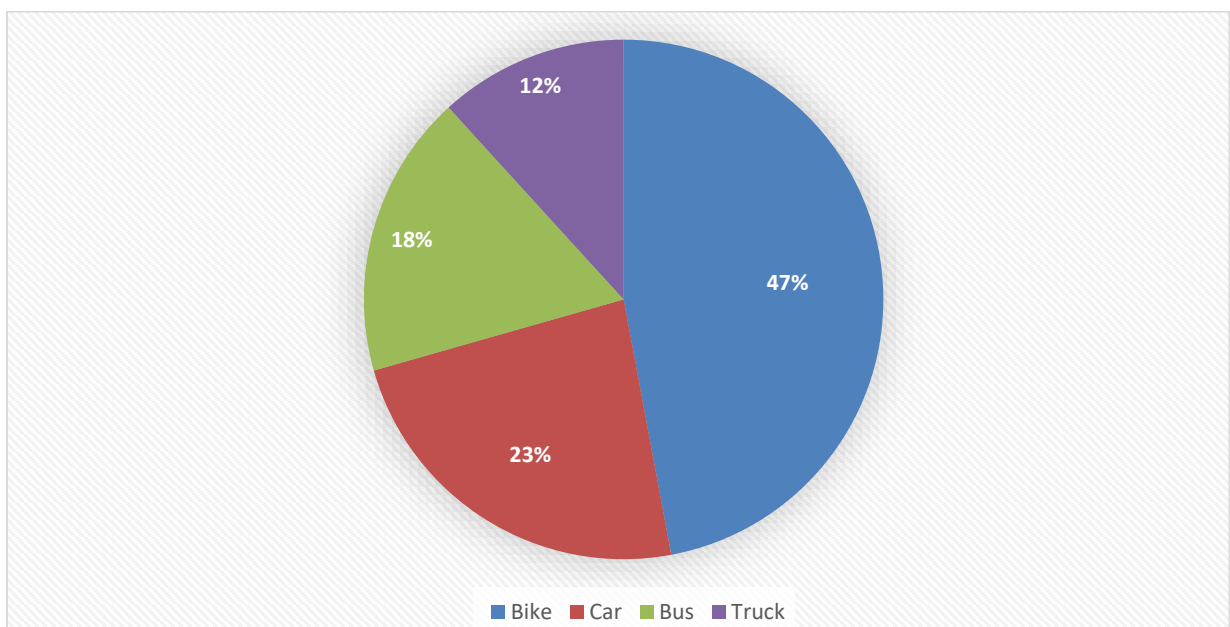
Figure: 4.3.12: vehicle is mainly responsible for an accident on Dhaka – Mawa expressway

Comment: In our survey we found, bike 47%, car 23%, bus 18% and truck 12% total at the selected roads on Dhaka Mawa Expressway vehicle is mainly responsible for accident.

15. Which places the accident occurred maximum time in this expressway?

Ans.

1. Shreenagar upazila
2. Hashara school gate
3. Munshiganj's Louhajang upazila
4. Dhaleswari Bridge

16. What is the main reason for a road accident?
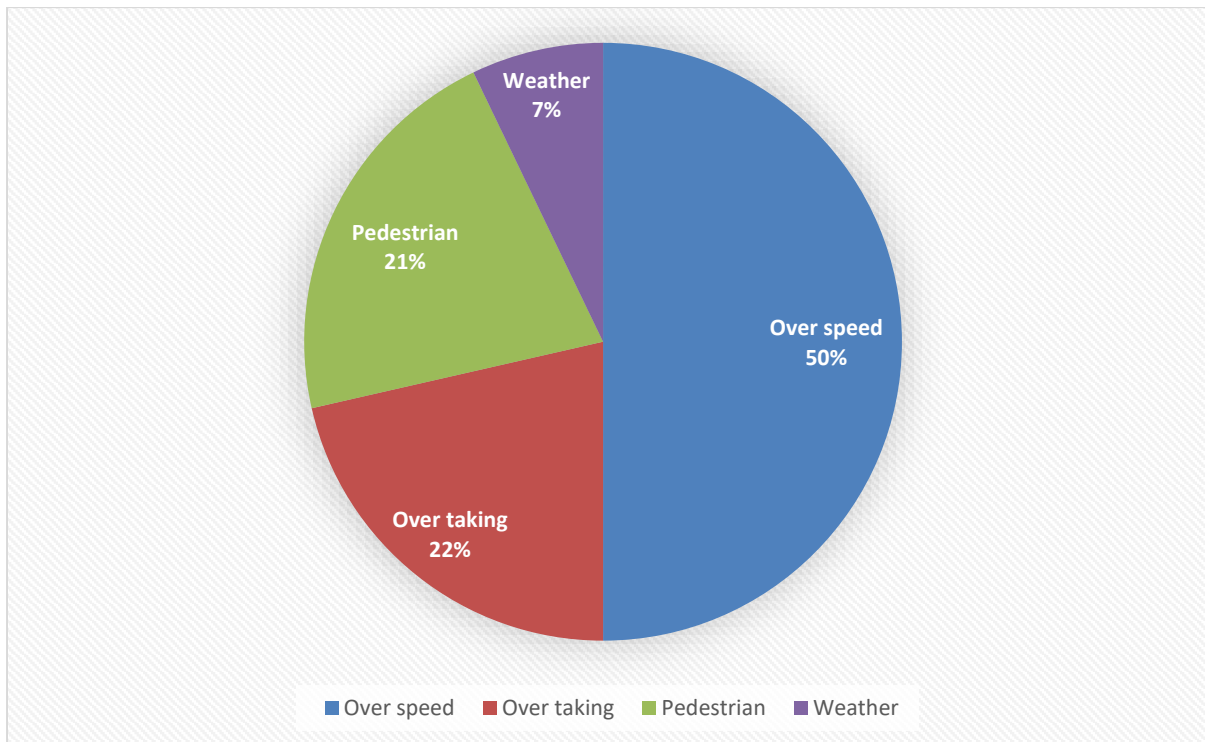
Figure: 4.3.13: Main reason for a road accident on Daka Mawa Expressway

Comment: In our survey we found the main reason for a road accident at over speed 50%, overtaking22%, pedestrian 21% and Weather 7%, at the selected roads on Dhaka - Mawa Expressway.

17. What kind of problems do you face while driving?
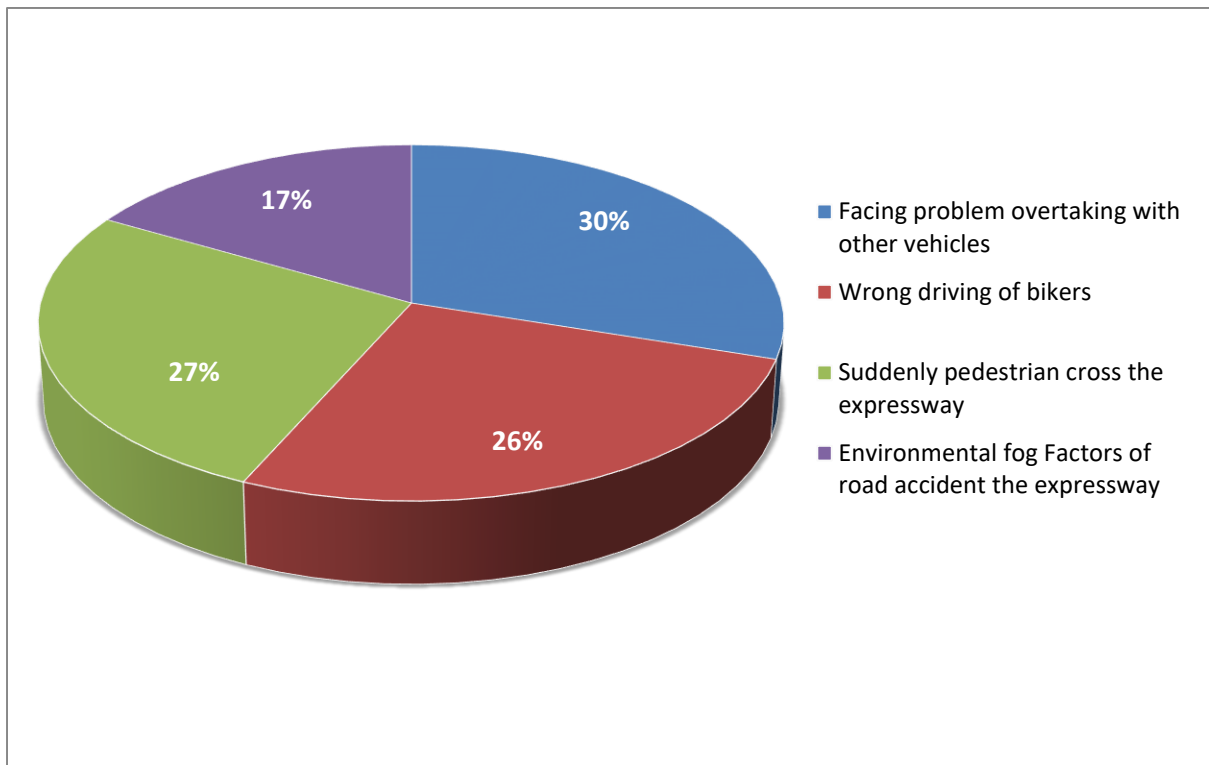
Figure: 4.3.14: Driver facing problems on Dhaka – Mawa expressway

Comment: In our survey we found the kind of problems do you face while driving at facing problem overtaking with other vehicles 30%, wrong driving of bikers 26%, suddenly pedestrian cross the expressway 27% and environmental fog factor of road accident the expressway 17%, at the selected roads on Dhaka - Mawa Expressway.

18. Have you faced any snatcher in this route?
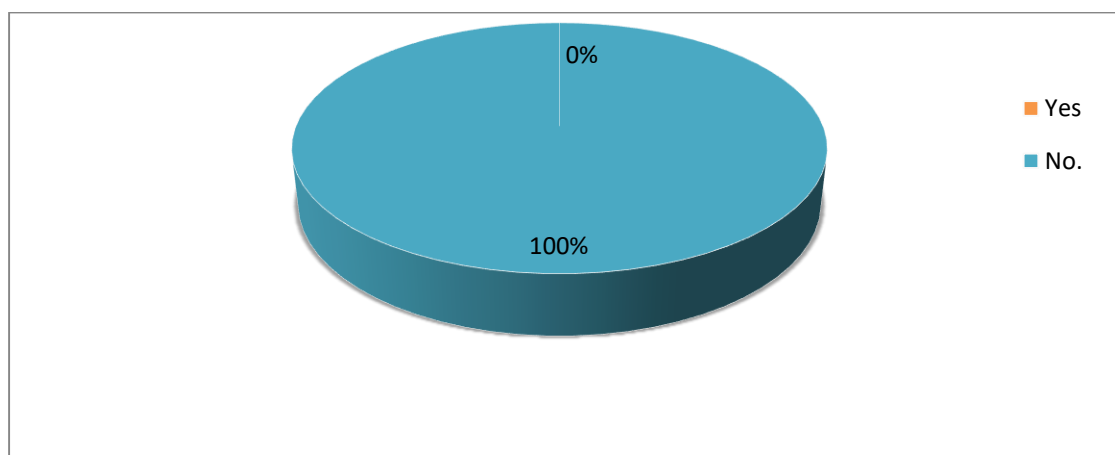
Figure: 4.3.15: Have you faced any snatcher on Dhaka – Mawa expressway.

Comment: In our survey we found the faced any snatcher in this route at 100% driver positive answer and 0% driver negative answer.

19. What is your suggestion to reduce an accident?

Ans :

1. To improve road system, as like as use proper sign and signal.

2. Overtaking must be eliminated and proper trained up the drivers.

3. Fixed speed limit in dangerous point.

4. Government should take hard step against the drivers and pedestrians for breaking the traffic rules.

5. To improve vehicle fitness.

4.3.2 Asking Question to passenger

1. **How many days do you travel in this expressway?**
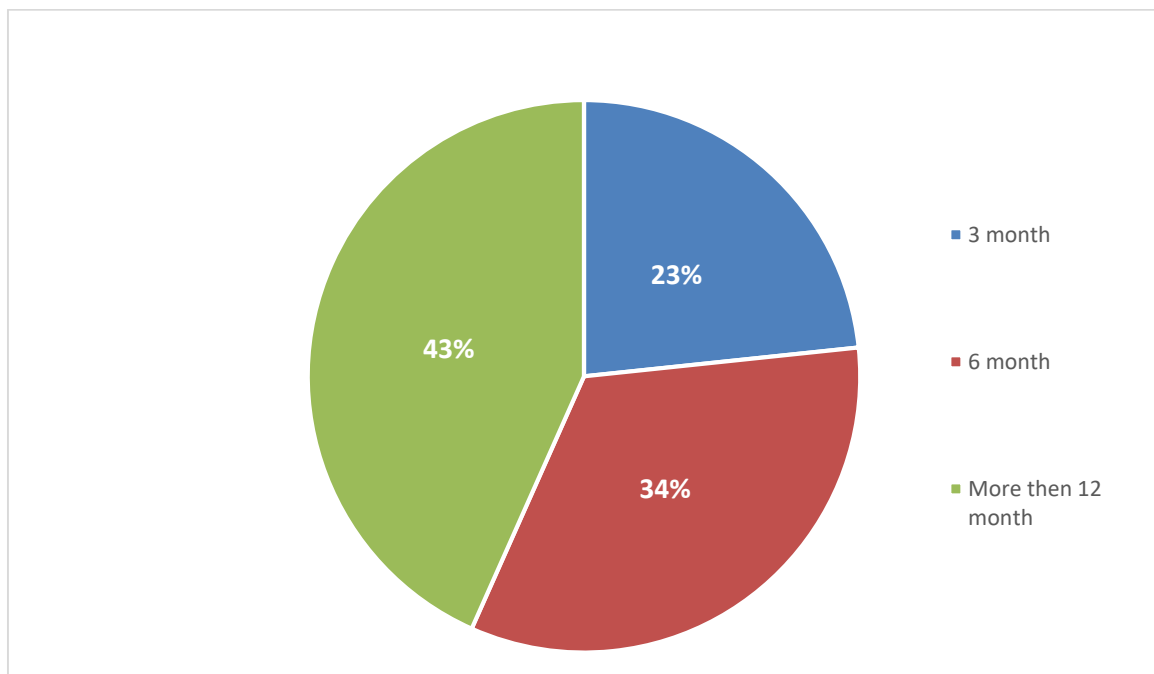
Figure: 4.3.2.1: How many days do you travel in this expressway

Comment: In our survey we found the Passenger travel time chart on Dhaka at three month 23%, six month 34 % and more then 12 months 43% at the selected roads on Dhaka - Mawa Expressway.

2. How much time your need to travel in Dhaka mawa expressway?

Vehicles Name	Time
Bus	40-50 minute
Private car	30-40 minutes
Motorcycle	25-30 minute

3. What is the difference between present condition and previous condition before 2011?

Present Condition	Previous Condition before 2011
1. As there is no speed breaker on the present road so everyone can easily pick up the speed (80 mph) prescribed by the government.	1. There were a lot of speed breakers on this road before 2011 so the vehicles could not reach the desired speed.
2. Currently the road are good so the cars can move at their fixed speed.	2. Earlier, even due to bad roads, the car could not accelerate to desired speed, so it took a long time to get to a certain place.

4. How was the bus fare in the highway? And now, how is the bus fare in the Expressway?

Ans: * Dhaka-Mawa Highway bus fare 70 taka On Bus (Gulisthan $\rightleftarrows$ Mawa) &

(Pstogola $\rightleftarrows$ Mawa)

5. Vehicle pressure in Dhaka-Mawa expressway at morning.
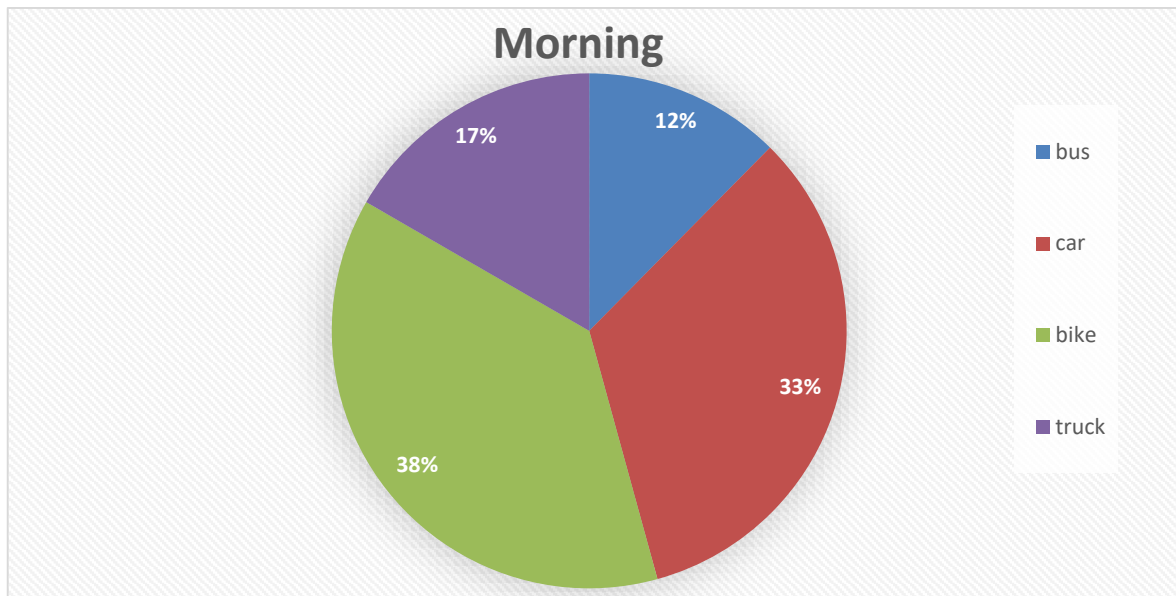
Figure: 4.3.2.2: Vehicle pressure in Dhaka Mawa expressway at morning

Comment: From the result of survey, we found that the vehicles pressure in Dhaka to Mawa expressway at Morning, bus 12%, car 33%, bike 38%, and truck 17%.

6. Vehicle pressure in Dhaka-Mawa expressway at evening.
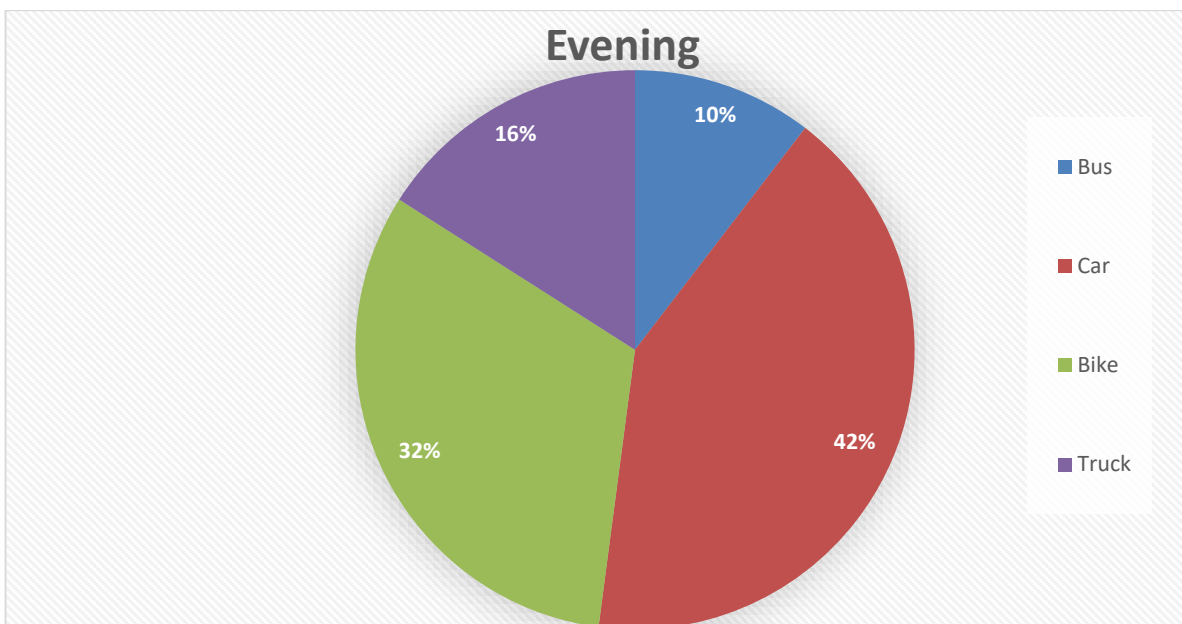
Figure: 4.3.2.3: Vehicle pressure in Dhaka mawa expressway

Comment: From the result of survey, we found that the vehicles pressure in Dhaka to mawa expressway at Evening, bus 10%, car 42%, bike 32%, and truck 16%.

7. What is your opinion about the road accident in Dhaka Mawa expressway?

1. Maximum accident occurs for new bikers.

2. Bikers are don't follow the traffic system and speed limit.

3. The major causes of expressway road accident are always drivers and pedestrians related. When the drivers failed to see pedestrian and fail to attention than it will be occurred accident.

8. What is the reason behind the accident in this expressway?
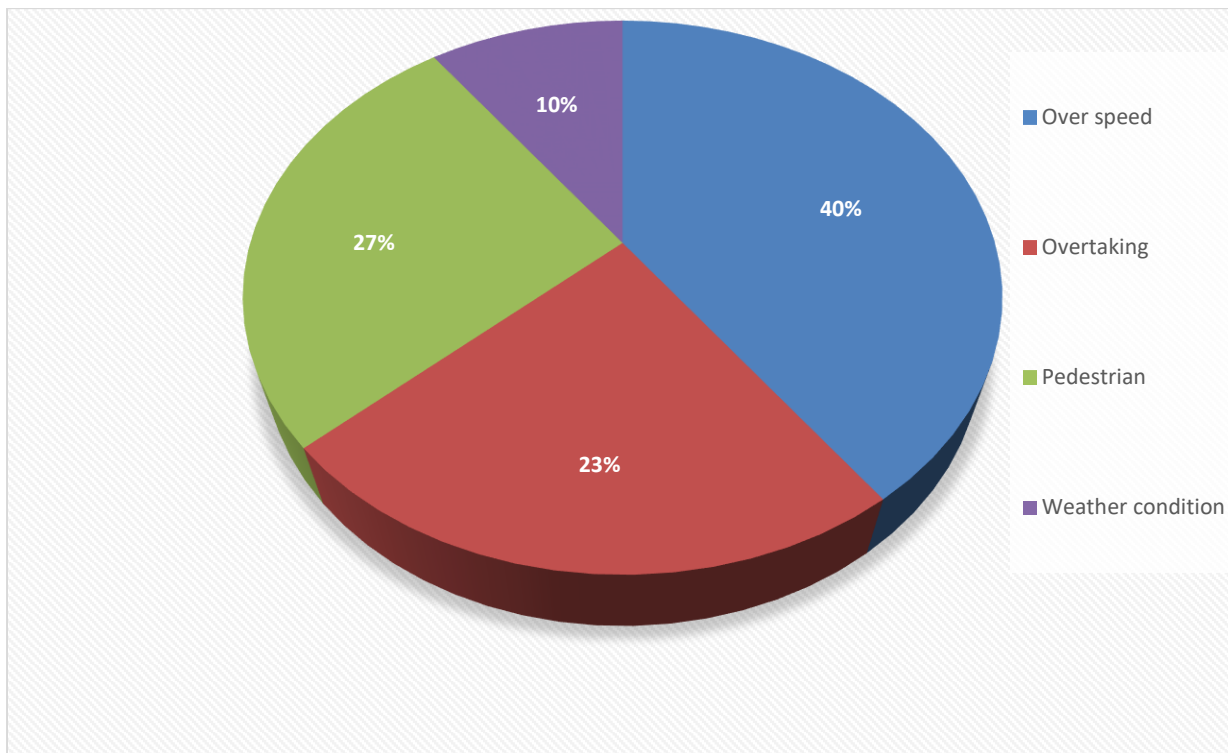
Figure: 4.3.2.4: the reason behind the accident on Dhaka – Mawa expressway.

Comment: In our survey we found the reason behind the accident in this expressway at over speed 40% overtaking 23%, pedestrian 27% and weather condition10%, at the selected roads on Dhaka - Mawa Expressway.

9. Do you think vehicles run at over speed on this route?
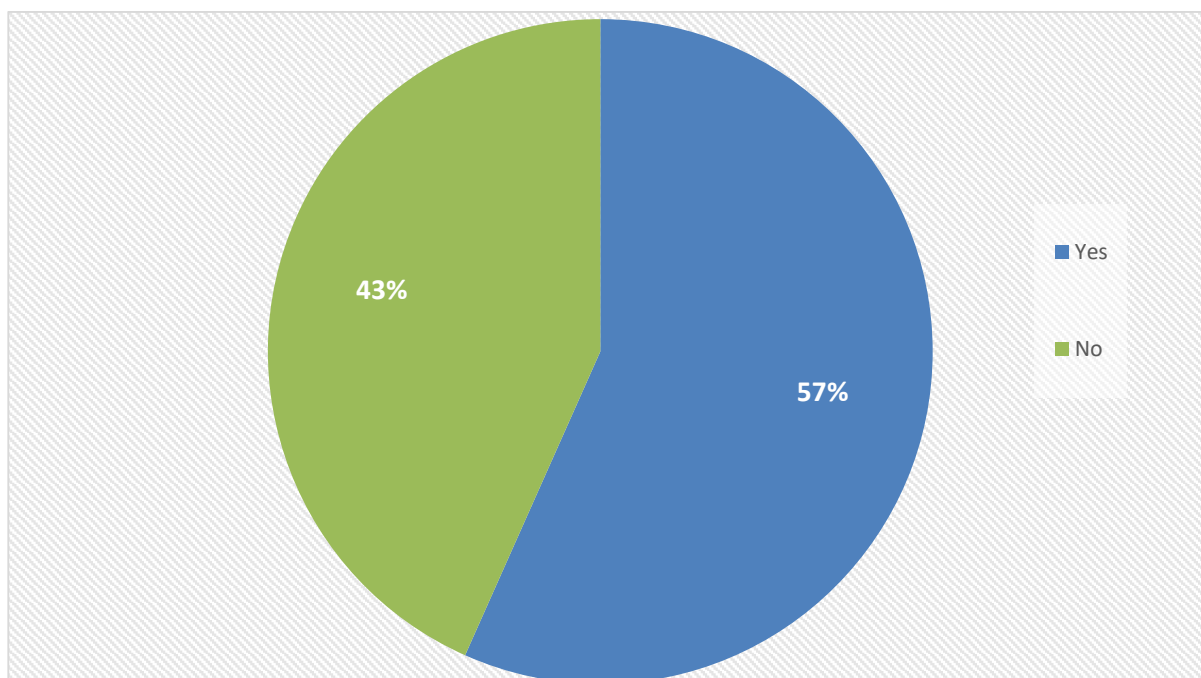
Figure: 4.3.2.5: vehicles run at over speed on this route on Dhaka – Mawa expressway

Comment: In our survey we found the vehicles run at over speed on this route at 57% passenger are yes and 43% passenger are no at the selected roads on Dhaka - Mawa Expressway.

10. What facilities are you enjoying and what facilities are needed?

Facility Enjoying	Facility Needed
We enjoying no signal, no speed breaker, no traffic jam, high speed and convenience for drivers and passengers.	Adequate foot-over bridge are need in important places. Need CCTV coverage in this expressway.

11. Do you have road accident experience?
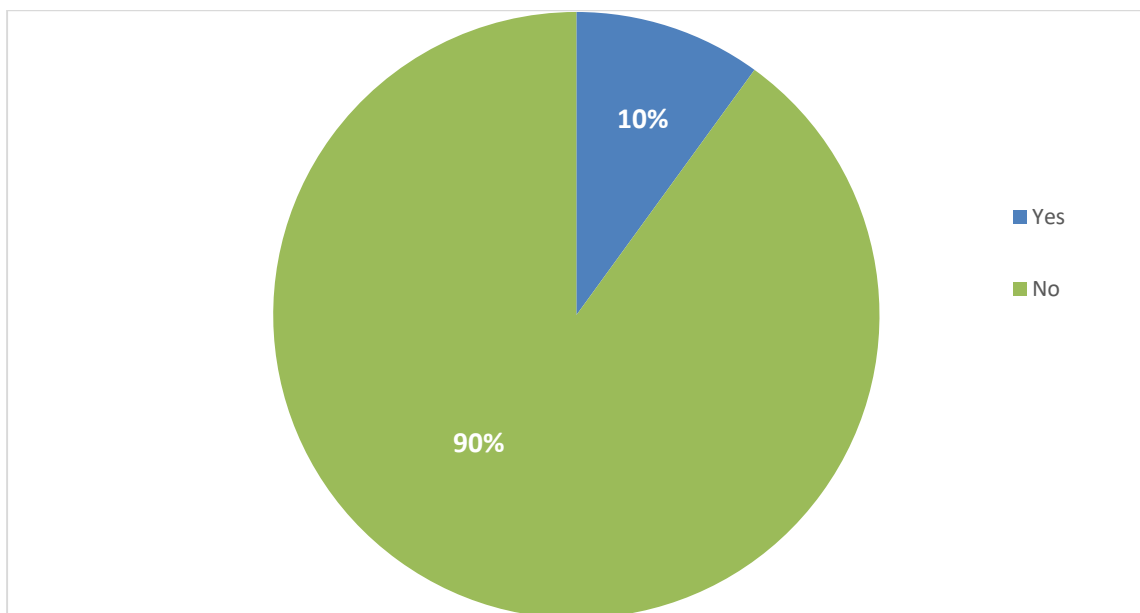
Figure: 4.3.2.6: Road accident experience on Dhaka – Mawa expressway

Comment: In our survey we found the experience any road accident at 10% passenger are yes and 90% passenger are no at the selected roads on Dhaka - Mawa Expressway.

12. Which step should be taken to prevent the road accident, Give your suggestion about that?

Step-1:To reduce competition between two drivers	Step-2: To know the driver proper knowledge of traffic rules.
Step-3: To obey the proper traffic rules while driving vehicles.	Step-4: To know the pedestrian proper knowledge of traffic rules.
Step-5: Pedestrian should use foot-over bridge.	Step-6: Adequate foot-over bridge are need in important places

4.3.3   Different types of vehicles speed

Maximum speed of Dhaka Mawa expressway is (130-140) km/hr., and average speed of this expressway is (90-100) km/hr. But it differs by different vehicles, Fig-4.3 shows that Bus (50-90 km/hour), Truck (40-80 km/hour), private Car (95-120 km/hour) and Motorcycle (60-120 km/hour.
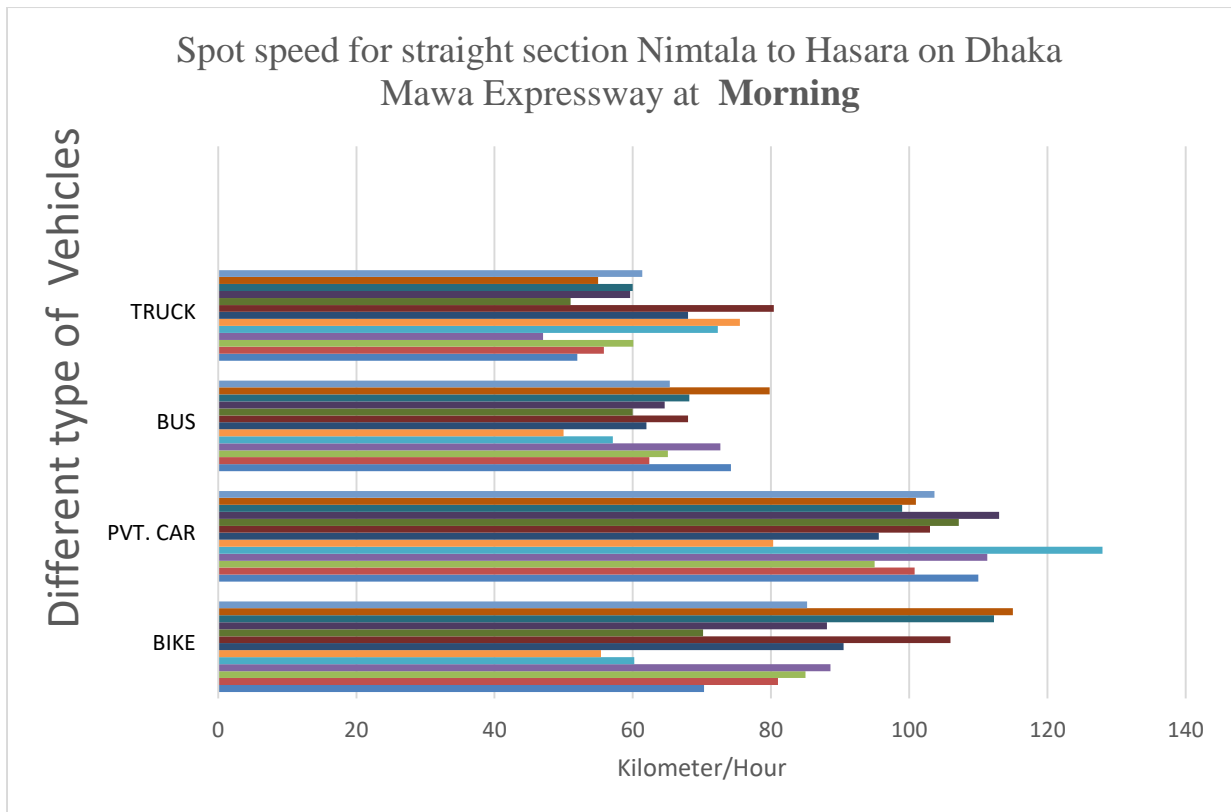
Figure 4.3.3.1:Spot speed chart

	Vehicle 1 (kmph)	Vehicle 2 (kmph)	Vehicle 3 (kmph)	Vehicle 4 (kmph)	Vehicle 5 (kmph)	Vehicle 6 (kmph)	Vehicle 7 (kmph)	Vehicle 8 (kmph)	Vehicle 9 (kmph)	Vehicle 10 (kmph)	Vehicle 11 (kmph)	Vehicle 12 (kmph)	Average
BIKE	70.3	81	85	88.6	60.2	55.4	90.5	106	70.2	88.1	112.3	115	85.2167
CAR	110	100.8	95	111.3	128	80.3	95.6	103	107.2	113	99	101	103.683
BUS	74.2	62.4	65.1	72.7	57.1	50	62	68	60	64.6	68.2	79.8	65.3417
TRUCK	52	55.8	60.1	47	72.3	75.5	68	80.4	51	59.6	60	55	61.3917

Table 4.3.2: Data table for different types of vehicles speed at Morning
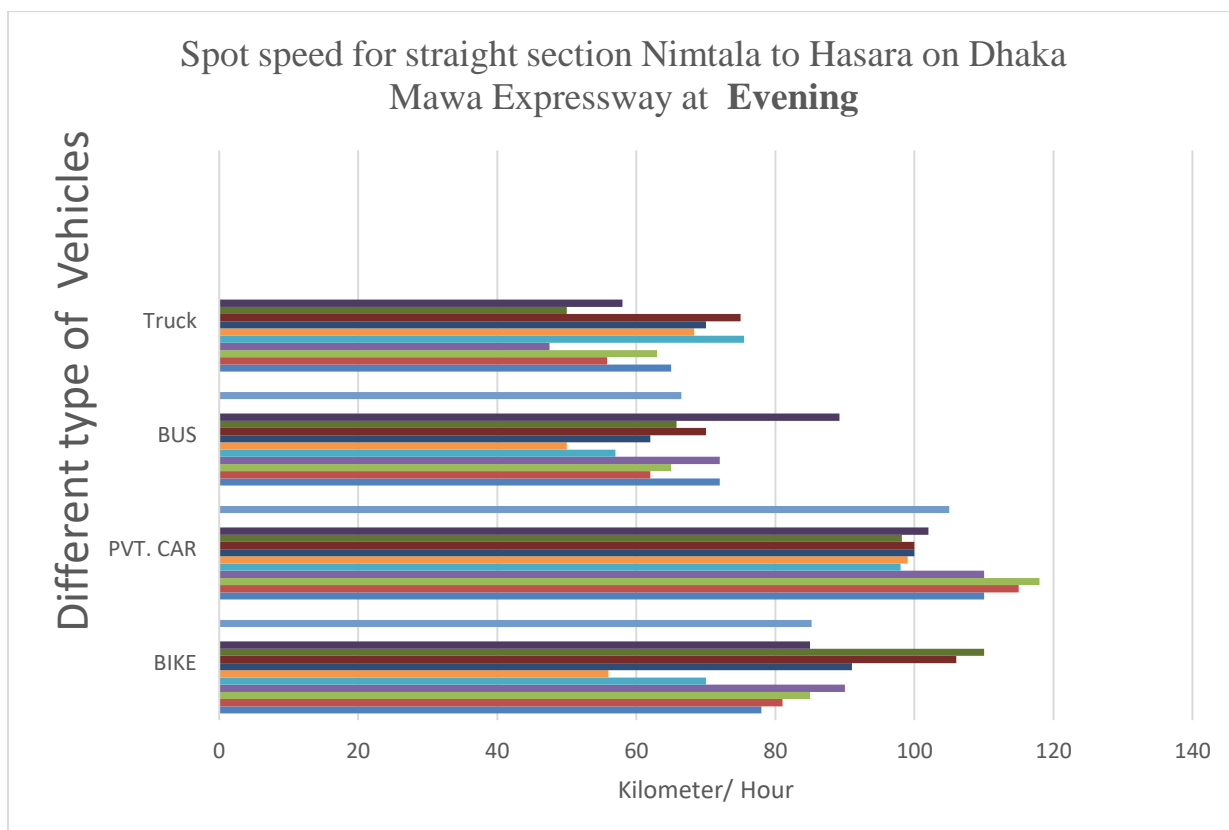
Figure 4.3.3.2: Spot speed chart

	Vehicle 1 (kmph)	Vehicle 2 (kmph)	Vehicle 3 (kmph)	Vehicle 4 (kmph)	Vehicle 5 (kmph)	Vehicle 6 (kmph)	Vehicle 7 (kmph)	Vehicle 8 (kmph)	Vehicle 9 (kmph)	Vehicle 10 (kmph)	Average
BIKE	78	81	85	90	70	56	91	106	110	85	85.2
CAR	110	115	118.5	110.5	98	99.5	100.6	100.5	98.2	102	105.28
BUS	72	62	65	72	57	50	62	70	65.8	89.2	66.5
Truck	65	55.8	63	47.5	75.5	68.3	70	81.2	50	58	63.43

Table 4.3.3.3: Data table for different types of vehicles speed at evening

Difference between average speed morning and evening:

Different Vehicles	Morning Vehicles Speed Average	Evening Vehicles Speed Average
Bike	85.2167	85.2
Private car	103.683	105.28
Bus	65.3417	66.5
Truck	61.3917	63.43

Table 4.3.3.5: Difference between average speed morning and evening

Speed range for Morning

Speed (Kmph)	Total vehicles
45-50	2
51-55	4
56-60	6
61-75	4
66-70	5
71-75	5
76-80	3
81-85	2
86-90	3
91-95	1
96-100	2
101-105	3
106-110	3
111-115	4
116-120	0
121-130	1

Speed range for Evening

Speed (Kmph)	Total vehicles
45-50	3
51-55	0
56-60	4
61-75	5
66-70	5
71-75	2
76-80	2
81-85	4
86-90	2
91-95	1
96-100	3
101-105	2
106-110	3
111-115	3
116-120	1

Types of Accident:

We identified the four types of accident occurred in dhaka to mawa expressway
1. Rear end collision
2. Side impact collision
3. Single vehicles collision
4. Hit pedestrian

Date time and location of accident places:

Date	Time	Location
Apr 30, 2022	9:00 AM	Chaltipara area of Hasara, Sreenagar
Jun 14, 2022	04.00 PM	Sreenagar, Munshiganj
Aug 08,2022	09:00 PM	Keuchira area near of Shamaspur
Nov 22, 2022	11:55 PM	Rajendrapur, Ikuria
Dec 02, 2022	02:45 AM	Hasara, Sreenagar, Munshiganj

Table 4.3.3.5: Date time and location of accident places.
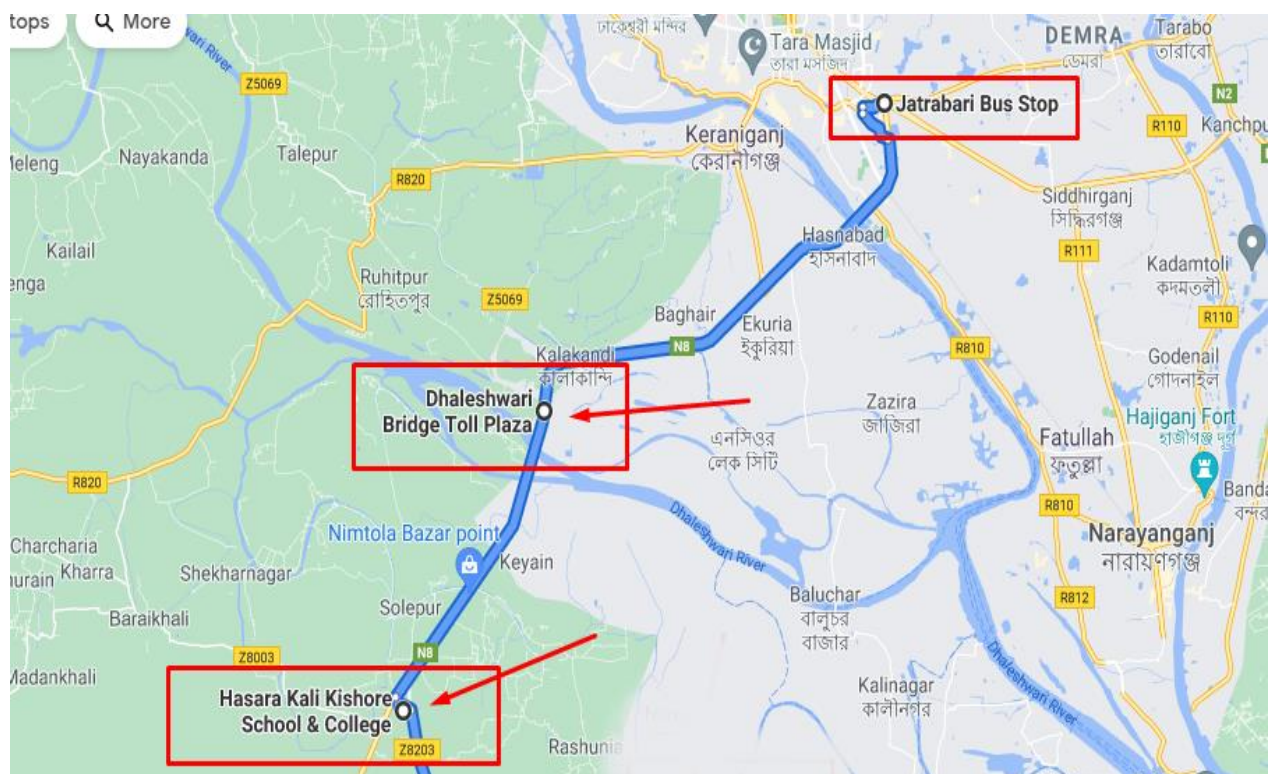
Figure 4.3.3.3: Dangerous spot on Dhaka- Mawa Expressway

Figure 4.3.3.1: Speed measurement of a running vehicle

4.4   From field survey we observed different problem. Now we discuss about different type of problem:

4.4.1   Road Speed Limit

Fixing speed limits depending on the designs: Speed limits are provided in roads depending on the road condition like, condition of road surface, traffic congestion, use of traffic lanes, horizontal and vertical curves in roads. In Bangladesh, there are speed limits in some of the selected roads; however, so far these limits have been ignored both by the drivers as well as by law enforcing agencies. Separating different modes of traffic and lane management is required for effective use of speed limits that reduces accidents.

Figure 4.3.2: Speed Limit at Dhaka-Mawa Expressway

4.6.2 The lighting condition.

Proper road lighting can decrease the rate of accident during night.
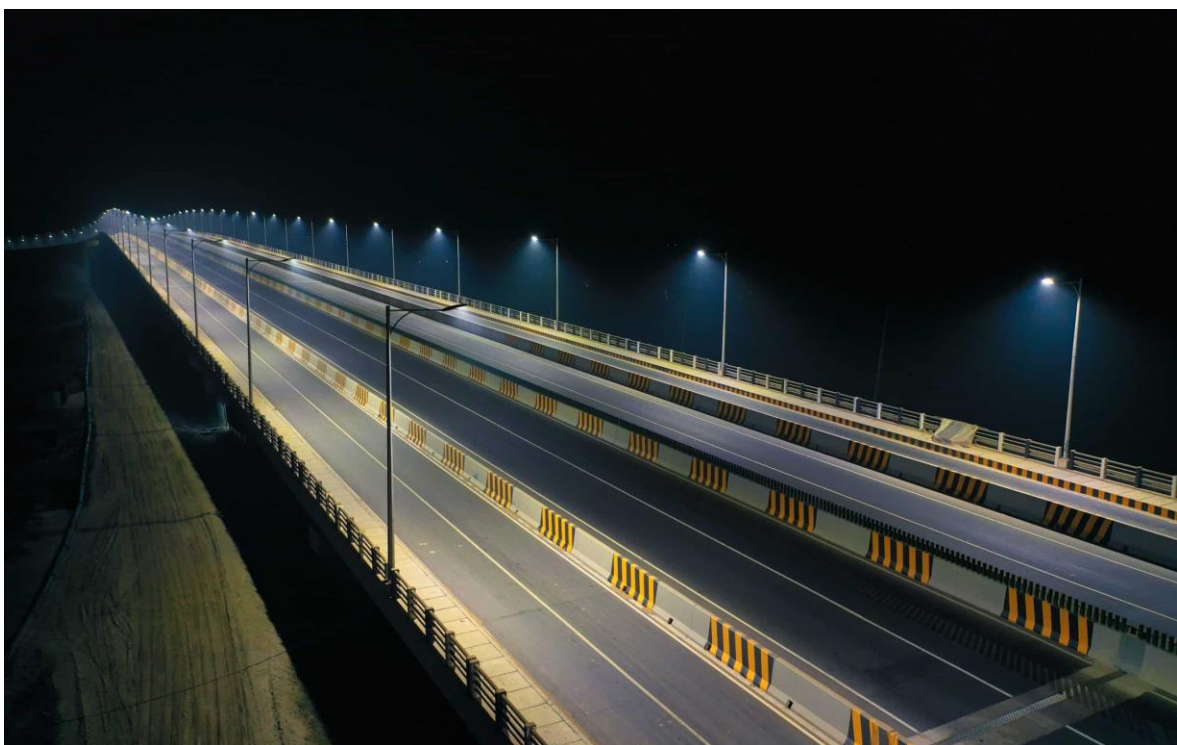
Figure 4.3.3: Lighting Condition of Dhaka-Mawa Expressway

4.3.3 Pedestrian facilities

Lack of knowledge regarding road users' traffic rules and regulations, violations of regulations and carelessness in using the road way are the main reasons for road accidents. In adequate pedestrian facilities also lead to accidents.

Passenger camp on Dhaka - Mawa expressway

- HASANABAD Passenger camp
- EKURIYA Passenger camp
- RAJENDROPUR Passenger camp
- NIMTOLA Passenger camp
- HASARA Passenger camp
- SHOLGHOR Passenger camp
- BEJGAON Passenger camp
- SREENAGAR FERI GHAT Passenger camp

Bejgaon area over bridge

Figure 4.3.4: Pedestrian facilities of Dhaka-Mawa Expressway

4.3.4   Accidents in that route

Improving road safety and reducing accidents require a multi-pronged approach because there are nine major causal factors at work. These include reckless driving, untrained drivers, unfit vehicles, simultaneous operation of motorized and non-motorized vehicles without separation and adequate rules, vulnerable road-side activities, faulty road design, poor traffic enforcement, lack of road safety awareness and a culture of impunity with poor legal redress.

Figure 4.3.5: Accidents in that route of Dhaka-Mawa Expressway

4.4 Result

4.4.1 Result summary of "Drivers" of Dhaka to Mawa Expressway

Serial no	Topic	Result											
1	How many years of experience as a driver?	0-5	17%	5-10	20%	10-15	33%	15-20	17%	20-25	10%	25-30	3%
2	How old are you?	20-25	13%	25-30	40%	30-35	27%	35-40	13%	40-45	7%		
3	Do you have your license?	No	6%	Yes	94%								
4	Your driving license is for which vehicles?	Professional	62%	Non Professional	38%								
5	How many types of vehicles travel in this expressway?	Bus	12%	Car	37%	Bike	35%	Truck	16%				
6	How much average speed for different types of vehicles?	Bus	100-80 Km/h	Truck	80-70 Km/h	Car	120-100	Bike	120-90				
7	Vehicles pressure in Dhaka-Mawa expressway at Morning	Bus	15%	Car	33%	Bike	38%	Truck	13%				
8	Vehicles pressure in Dhaka-Mawa expressway at Evening	Bus	10%	Car	42%	Bike	32%	Truck	16%				
9	What is your opinion about the lighting condition of expressway?	Good	100%	Poor	0%	Average	0%						

Serial	Topic	Option	%	Option	%	Option	%	Option	%
10	What kind of accident generally takes place in this route?	Rear end Collision	13%	Side impact collision	23%	Single car accident	34%	Hit pedestrian	30%
11	In which time to the accidents generally take place?	Day time (pick hour/ off pick hour)	61%	Night time	39%				
12	According to you which vehicle is mainly responsible for an accident?	Bike	47%	Car	23%	Bus	18%	Truck	12%
13	What is the main reason for a road accident?	Over speed	50%	Over taking	22%	Pedestrian	21%	Weather	7%
14	Have you faced any snatcher in this route?	No	100%	Yes	0%				

4.4.2 Result summary of "Passenger" of Dhaka to Mawa Expressway

Serial no	Topic	Result							
1	How many days do you travel in this expressway?	3 Month	23%	6 Month	34%	More than 12 Month	43%		
2	How much time your need to travel in Dhaka mawa expressway?	Bus	40-50 minute	Private car	30-40 minutes	Bike	25-30 minute		

3	How was the bus fare in the highway? And now, how is the bus fare in the Expressway?	Highway (Gulistha n $\rightleftarrows$ Mawa) & (Pstogola $\rightleftarrows$ Mawa)	70 taka						
4	Vehicle pressure in Dhaka mawa expressway at morning	Bus	17%	Car	33%	Bike	38%	Truck	12%
5	Vehicle pressure in Dhaka mawa expressway at evening?	Bus	10%	Car	42%	Bike	32%	Truck	16%
6	What is the reason behind the accident in this expressway?	Over speed	40%	Over taking	23%	Pedestrian	27%	Weather condition	10%
7	Do you think vehicles run at over speed on this route?	Yes	57%	No	43%				
8	Do you have road accident experience?	Yes	10%	No	90%				

4.5   Discussion

Fixing speed limits depending on the designs: Speed limits are provided in roads depending on the road condition like, condition of road surface, traffic congestion, use of traffic lanes, horizontal and vertical curves in roads. In Bangladesh, there are speed limits in some of the selected roads; however, so far these limits have been ignored both by the drivers as well as by law enforcing agencies. Separating different modes of traffic and lane management is required for effective use of speed limits that reduces accidents. Proper road lighting can decrease the rate of accident during night. Lighting is particularly desirable at intersections, bridge site and at places where there are restrictions to traffic movement. Bus stoppages are not allowed in the junction area. In the project, most of buses are stop in the critical area of the junction. This is another management problem that can be minimized by applying some types of enforcement. Lack of knowledge regarding road users' traffic rules and regulations, violations of regulations and carelessness in using the road way are the main reasons for road accidents. In adequate pedestrian facilities also lead to accidents. Pedestrian facilities such as sidewalks, cross walks, special pedestrian barriers, pedestrian refuge islands, and pedestrian tunnels and over pass should be design properly to reduce accidents. Improving road safety and reducing accidents require a multi-pronged approach because there are nine major causal factors at work. These include reckless driving, untrained drivers, unfit vehicles, simultaneous operation of motorized and non-motorized vehicles without separation and adequate rules, vulnerable road-side activities, faulty road design, poor traffic enforcement, lack of road safety awareness and a culture of impunity with poor legal redress.

CHAPTER 5

CONCLUSIONS AND FUTURE WORKS

In this study several attempt has been made to see in depth into the comparison of accident patterns on three selected area. The next attempt in this study is to find out the study of average daily traffic and accidents on Dhaka-Mawa Expressway. Another attempt in this study is also to find out high accident frequency location with available accident data and identification of probable causes of accidents with remedial improvements for several spots on Dhaka-Mawa Expressway. In view of this research project investigation on accidents characteristics analysis, comparative high daily traffic and accident analysis selected site on Dhaka-Mawa Expressway several findings and recommendations are made. This chapter briefly presents findings of this study with some recommendations on this selected area. This chapter is also recommended further several comparative studies on this selected area.

5.1   Recommendations

Following are the few recommendations for future research study:

- Need more Study and analysis in these routes.
- A new Survey should be conducted after the pandemic situation
- Communicate with more passengers and driver for more information.
- Need to conduct surveys on more vehicles to get more information
- Should not talk to the bus driver while moving
- Development of road network with proper and long-term planning.
- Need high-tech protection system including CCTV surveillance for Dhaka-mawa expressway, vowing smooth traffic and drop offensive use of the 6-lane road.
- Use of seat belt in four- wheeler is mandatory and not wearing seat belt and helmets doubles the chances of survival in a serious accident.
- One of the worst habits anyone can get into is talking on a cell phone while driving. Keep a cell phone with you in the car for emergency situations only. If you have to use a cell phone, pull safely over to the side of the road.
- When you're switching lanes on a motorway, indicate several seconds before you change lane to allow other lane users time to prepare for your lane change.
- The risk of a fatal crash is three times higher at foggy night than in the day for every mile driven. It's better to avoid nighttime driving if you're comfortable driving during the day.
- Most important method to bring down accidents is strict enforcement of speed limits. 90 % of accidents can be avoided by strict enforcement of speed limits.
- License of those who are involved in accidents should be suspended immediately, at least until they prove that they are not guilty. License of those who make serious accidents should be cancelled immediately.
- Pedestrian need to stop crossing the road.

- Adequate foot-over bridges should be provided at important places.
- Government can take positive steps to reduce expressway road accident. Most of the drivers think that the government is not sincere to reduce accident. So drivers said that these steps should be taken to reduce accident: increase awareness, increasing the awareness of passenger and pedestrian

5.2   Conclusion

Road accident is most unwanted thing to happen to a road user, though they happen quite often. The most unfortunate thing is that we don't learn from our mistakes on road. Most of the road users are quite well aware of the general rules and safety measures while using roads but it is only the laxity on part of road users, which cause accidents and crashes. Main cause of accidents and crashes are due to over speed, overtaking, pedestrian and Weather at the selected roads on Dhaka - Mawa Expressway. Most of the fatal accidents occur due to over speeding. It is a natural psyche of humans to excel. If given a chance man is sure to achieve infinity in speed. But when we are sharing the road with other users we will always remain behind some or other vehicle. Increase in speed multiplies the risk of accident and severity of injury during accident. Faster vehicles are more prone to accident than the slower one and the severity of accident will also be more in case of faster the severity of accident will also be more in case of faster vehicles. Higher the speed, greater the risk. At high speed the vehicle needs greater distance to stop i.e. braking distance. A slower vehicle comes to halt immediately while faster one takes long way to stop and also skids a long distance due to law of notion. A vehicle moving on high speed will have greater impact during the crash and hence will cause more injuries. The ability to judge the forthcoming events also gets reduced while driving at faster speed which causes error in judgment and finally a crash.

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